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Here's the new Douglas RB66A on its way to reconnaissance plane for the U.S. Air Force. It's a smooth, versatile performer, designed to operate in the atmosphere at over 50,000 feet for low-level missions. This high performance aircraft will use the new J75 engine which incorporates Sundstrand's "Sundstrand Model" Constant Speed Drive. The drive converts the varying speeds of the turbo jet to a constant speed for driving engines or frequency a-c generators. The generators supply power for hundreds of electrical components aboard the plane...with less

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RESEARCH REPORT

B.F. Goodrich

FIRST IN NUMBER



Low-pressure seal prevents high altitude blowouts

B-66RB type concepts on the early Sabres had to be safely pressurized at altitudes of 8 miles or higher. Ordinary reliable seals between the bubble and cockpit would also blow out from the effect of low pressure on the outside, high pressure on the inside.

B. F. Goodrich engineers were called in on the problem. A truly effective seal, they believed, should operate with low pressure and stretch very little or not at all. Low stretch would mean less wear. They worked out a seal with a U-shaped solid rubber base. A sub-

limb fabric diaphragm stretched inside the base simply lifts when inflated. (See diagram above.) It works like blowing up a paper bag—low pressure gives full expansion with practically no stretch. Diaphragm stretching of nine mils (like blowing up a mylar bag) is eliminated.

The new inflatable strip works almost instantly. Even in minus 65° it inflates with less pressure than ordinary seals needed in warm temperatures. There are other advantages. It rubs wet and dries better than ordinary seals. It fits complex curves better. It seals and seals faster. Sliding wear and scuffing

are minimized.

The new B. F. Goodrich seal is now in use on more than a dozen makes of planes, including fighters, jet fighters and bombers.

Other B. F. Goodrich products for aircraft include: tires, wheels and brakes, De-ice, bleed valves, Fuel-air Scavenging Systems, fuel cells, bearings, actuators. The B. F. Goodrich Company, Akron, Ohio, Toledo, Ohio.

B.F. Goodrich
FIRST IN NUMBER



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Some of the great names in the Motor Car Industry recently celebrated their 50th Anniversary and now the Aircraft Industry relates its dramatic and enchanting history of Powered Flight over a fifty-year period. • The astounding growth of these two industries would have been impossible without Forgings which are used wherever maximum strength with minimum weight is essential. • Wyman-Gordon has been privileged to serve these industries from their beginning... has kept abreast of progress and has planned many advancements in Forging and Heat Treating techniques and in quality control. • There is no substitute for a Forging - and in a Forging there is no substitute for Wyman-Gordon quality and experience.

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Domestic

Turboprop failure in a Wright Turbo Corporation engine that again failed in American Airlines DC-7 to return to Los Angeles during an enroute flight, the second such incident since AA began operating the Douglas transport (Aviation Week Dec. 23, p. 7). In the latest incident, blades were stripped off one of three turboprops on the No. 4 engine as the plane flew over Boco Canyon, Utah. Crew reduced speeds by using two of the turboprops, feathered the propeller and returned to Los Angeles without further incident.

Turboprop transports hold a strong edge over jet liners in quiet and economical operation, says Eda Murta, general manager of Wright Aerojet Corp.'s Hamilton Standard Division. The propeller producer's chief was an engineering study indicates a turboprop transport can equal speed of a jet liner.

Boeing Aerojet division have elected Fred Jones, Oklahoma city dealer, chairman and Charles E. Reed, president, Elgin, Ill. (city) held by Thomas E. Reed, before the board of directors. 10 (Aviation Week Jan. 12, p. 25). J. W. Miller replaces Reed as executive vice president. The airline's board also has appointed Thomas F. Reed chairman of the executive committee.

Improved aircraft system for Boeing B-47 and Douglas B-66 will be designed by General Electric's aircraft products department under a new \$5 million USAF contract.

Quick Source configuration of this new D. Denny's employment to a year from the Civil Aeronautics Board appears likely. No application to the CAB vice chairman was offered during a brief, routine hearing before the Commission Committee.

Candidates frequently mentioned for appointment as head of staff director of the newly organized Air Navigation Board include Sam Stett, chief of Air Transport Board's Navigation and Traffic Control Division, and Col. Ernest C. Wood, Army's representative on the ANTB.

American has set a prize tag of \$25,000 on its "Flying automobile," reports delivery can be made from the Longview, Wash., plant in four months.

Financial

Boeing Aircraft Corp., Wichita, Kan.



Dornier YH-31 Put Through Paces

Dornier YH-31 makes a steep bank during a recent showing at Danbury, Conn., before the helicopter company's stockholders. Rapid climb, bank-off flight and autorotation landings also were demonstrated for the visitors. Company president Gailden S. Dornier said the dashboards the YH-31's performance has proved USAF research and development contracts for Dornier and that military production orders are expected. Dornier has licensed Heller Helicopters to build the YH-31 in the U. S., and it also is to be made in Canada by Dornier-Fleet Helicopters, Ft. Erie, Ont.

created its regular 25-cent dividend for the quarter ended Dec. 31, pending previously due the plane package from USAF after completion of its T-36 contract. It was the second such action taken in the past four months (Aviation Week Nov. 9, p. 7).

International

Investigation probing the crash of a Philippine Air Lines DC-6 Jan. 17 at Rome say there is no evidence as to the cause of the crash. No more wreckage was missing before the crash plane plunged into a violent jet and exploded, killing all 16 persons aboard. It was the first fatal accident in the carrier's international operation. The blast badly damaged the DC-6, leading investigation by representatives of PAA, Douglas Aircraft, Pratt & Whitney Aircraft and Curtiss Propeller.

Air France last week inaugurated 5-day, nonstop European and transatlantic service between Mexico City and New York, operating Caravelles, and Super Caravelles on bi-weekly flights. The new service connects with the carrier's transatlantic flight and operates under an agreement recently signed by U. S., France and Mexico.

New speed records claimed by two

KLM Royal Dutch Airlines management has been taken over by executive vice president F. Van der Horst, F. Beemans and M. J. van der Ploeg, pending appointment of a successor to the late Albert Plesman by the carrier's board of control.

Caribbean State Airlines transport crash near Prague Jan. 22, killing 15 persons, Prague newspaper Rude Pravo reports.

August sales figures will be listed by New Zealand on domestic and international airlines beginning next April to help pay for building and rebuilding fields and other aviation facilities. Estimated yield in 1954 \$3,362,000.

Col. Luis Calles, former air attaché of the Venezuelan embassy in Washington, is now president of government-owned Lanza Aeropostal Venezolana.

SERVES IN NAVY'S HUP-2



This right angle drive is part of the control system for the tail rotor of the HUP-2. It is the drive that connects the engine to the tail rotor. The drive is made of steel and is designed to handle the high torque of the tail rotor. It is a key component of the HUP-2's control system.

Model R 100 is used at the HUP-2. It is a model of the HUP-2's control system. The model is made of steel and is designed to handle the high torque of the tail rotor. It is a key component of the HUP-2's control system.

ANGULAR is a division of the HUP-2. It is a division of the HUP-2's control system. The division is made of steel and is designed to handle the high torque of the tail rotor. It is a key component of the HUP-2's control system.



3414 Chestnut Avenue
Hoboken 5, New Jersey

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January 25, 1954

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Washington Roundup

Aircraft Spending

Actual cash outlay for military aircraft procurement is scheduled to increase at a high level until the middle of 1955, according to President Eisenhower's fiscal 1955 budget message to Congress. The President estimates military aircraft procurement spending will total \$5.4 billion in fiscal 1954, \$5.5 billion in fiscal 1955 ending June 30, 1955.

Strategic Squabble

Big squabbling block in negotiating defense aircraft procurement program is Britain's bid to get the United States to finance a large share of the Royal Air Force's strategic bomber fleet. Britain wants to build its own strategic atomic bomber force of Valiant Vulcans, Avon Vulcans and Handley Page Victor, but wants U. S. to help foot the bill to the tune of about \$100 million annually. Foreign Operations Administrator Harold Stassen supports the RAF plan, but is getting better opinion from the Pentagon where feeling is that the U. S. taxpayer will have enough trouble supporting USAF's strategic air force and the Navy attack carrier forces without understanding the RAF bomber program. Personally, off-base aircraft procurement funds were devoted to lighter planes in an effort to plug serious deficiencies in Western Europe's air defense.

New Combat Cargo Command?

Are there is considering reorganizing a large portion of its military air transport resources into a new combat cargo command on the model pioneered in the Korean war by Lt. Gen. William Tamm and Maj. Gen. John F. Hendley.

The Korea Combat Cargo Command pooled all transport resources in the theater into a single organization trained to perform all types of unit missions and operated directly under the theater commander in daily priority of missions established by the top command.

Korean experience indicates the combat cargo command philosophy created an increased shift and better coordination with top combat organizations with a smaller, better-equipped force. Under the new plan MATS would be stripped of its cargo-carrying function.

Policy Progress

The two major policy problems just added to the agenda of the air policy review requested by Air Coordinating Committee by the President probably will not be completed by the April 1 deadline.

- Policy toward aircraft manufacturers (Aviation Week Jan. 4, p. 12). Aircraft Industries Assn. forced into analysis of this problem to the policy review agenda, but so far has produced no recommendations for inclusion therein.
- Review of air traffic control development and operations. Program system and program were last interrupted by Radio Technical Committee on Aviation (RTCA) shortly after World War II and crystallized into an operational pattern by Air Coordinating Committee's Special Working Group 5 in 1953.

Overseas Mail Problem

Civil Aeronautics Board will investigate proposals by two companies, Seaboard & Western and Transocean Air Lines, to fly military mail under contract. They have negotiated agreements with the military to land overseas Army and Fleet Post Office mail for 15 cents a non-mile, compared with certificated airlines rates ranging over \$1.

CAB has authorized that the government still gains by shipping, and to these already certain because if the space goes empty, the U. S. pays for it as subsidy money.

The CAB investigation will determine whether (the low seaborne rates) should be accepted on the ground that APO and FPO mail does not constitute "passage" (freight) within the meaning of Seaboard's and Transocean's authorization. Board must also determine whether the law (they) do not possess legal authority to transport the same.

User Charge Tactics

Air Transport Assn. plans to capitalize on the Postal Dept.'s backing of federal auto gas taxes to the level of federal highway appropriations in its State of the Union message. Treasury and Commerce Departments have maintained that federal auto gas "taxes" are not and not to be cranked for the special benefit of those paying them.

The airlines say they already pay their share of CAA services out through their two-cent gas tax and therefore oppose the extra "user charge" proposed by CAA. The President's backing of gas taxes to highway expenditures goes against the ATA claim that the airlines already pay their way on the aerial highways.

On the highway tax, Rep. Peter Mack already has introduced a bill to raise federal highway appropriations to the level of the auto gas tax revenue. Air Transport Assn. may urge introduction of a similar bill for CAA services appropriations, which would obviate need for all or most of the proposed user charges.

Welcome Proposal

CAB member Joseph Adams' proposal that the states should guarantee state responsibility for outlying local airports is being welcomed enthusiastically in some Congressional circles.

Sen. Robert Johnson, who has been dogmatic of Adams' record on the Board, commented: "In pointing out deficiencies which have existed in relationships between the local airport and the state and outlying airports, they serve and in recommending specifically how their deficiencies can be eliminated, member Adams has offered a sound, constructive approach whereby the states can offer support to our local service centers, supplementing the support and encouragement given state by the federal government."

CAB Subsidy

Civil Aeronautics Board's \$58 million before subsidy budget went into appropriations hearing last week, the Board counted on Chairman Chase G. Smith's work as a former senator to smooth proceedings. This is the first year that subsidy has been earmarked as an appropriation while spent from Post Office's annual appropriations.

—Washington staff

INDUSTRY OBSERVER

► **Perseus** Forthright has concluded that research on use of atomic power for aircraft propulsion will continue and specific funds will be requested in the fiscal 1955 budget to further this work.

► **Total U.S. military aircraft inventory** is scheduled to increase from the 35,000 planes now on hand to 40,000 by the end of 1957. Currently about 11,000 military aircraft are in use. Total of jets is scheduled to rise to more than 35,000 by 1957.

► **Douglas YC-124B** is undergoing two tests with its four Pratt & Whitney Aircraft T34 turboprops and is scheduled to fly soon. The YC-124B is an experimental prototype for the C-123 production version of the turboprop C-123B aircraft.

► **Air Force decision on whether to order an all-weather version of the North American F-100 Super Sabre** will hinge on the results of the second flight test program of the Canyon F-102. If the F-102 looks promising, United will ship the all-weather Super Sabre.

► **Newly recently available** is holding up release of information on two vertical-takeoff fighters prototypes built by Lockheed and Convair. Both are powered by Allison T34 turboprops.

► **United Aircraft Co., Ltd.**, has developed a new lightweight, medium-thrust, mid-low gas turbine which it is calling the Optacon. New engine is for operational jet aircraft and trainers.

► **Convair** will build a maximum of 10 F2V Sea Dart under a Navy production order for these turbo-propelled fighters.

► **Westinghouse Electric Corp.**, seriously is considering setting up one of Navy's recently announced Project Timberline nuclear-powered aircraft (Aviation Week Oct. 12 p. 72). Concept reportedly would be used both for military electronic equipment and inter-continental systems. If the work is made, it will have wide repercussions in the aviation and consumer goods fields.

► **Navy** is claiming a new altitude hat-act record as the result of a pilot leaving an F4F-6 at 35,000 ft. Pilot bailed out after an explosion accompanied by exceedingly high turbine temperatures and decelerating lights while flying at 35,000 ft. and 450 knots. He parachuted safely after a free fall of 25,000 ft.

► **Prototype Blackhawk and General Beverly**, B-47 version of the four-engine Universal Fighter, landed in less than 700 yd. fully loaded in recent gunnery tests. First tri-axle landing gear is fitted with Dunlop Mercat buster. Reverse gears were not employed in landing tests, company says. The transport lifted to 5,000 ft. on its four engines, after buster was out of blast, sustained altitude on two engines.

► **It is an axiom** that Convair has been having stability problems with the F-102. Retesting work on the delta-wing aircraft already is under way.

► **Allison J40** recently completed 1,200 hr. operation without repairs at Wright AFB, Tex.

► **Air Materiel Command** has developed a portable test stand for checking engine accessibility before mounting on bomber and cargo aircraft. The stand has an engine mount similar to an airplane, with controls and engine access duplicate.

► **Increasing number of chemical firms** are considering production of fused phenols for use in aircraft control surfaces as stiffening medium to replace conventional metal internal structure.

► **Air Force** is using statistical tables in estimating life expectancy of aircraft engines and thus accurately decreasing engine needs.

WHO'S WHERE

In the Front Office

► **A. B. Williams** is president of Aero Manufacturing Corp.'s newly consolidated Licensing Division. Williamsport, Pa. Other new officers: **Philip J. Rusk**, vice president and Williamsport plant manager; **Dr. Annie Frost**, vice president in charge engineering; **James E. Mitchell**, vice president in charge design; **Arthur Noll**, vice president in charge engineering; **Donald F. Brown**, vice president and Williamsport (Conn.) plant manager; and **Charles J. Moore**, controller.

► **H. M. Brown**, president of United Aircraft Corp., has been elected to serve as board chairman of General Aircraft Aircraft during the Delta aircraft order's transition from a UAC division to a separate company (Aviation Week Dec. 18 p. 14).

► **G. S. Moss** has resigned as vice president manufacturing of Hughes Aircraft, Burbank, Calif., to join Carter Products, also at Burbank, as vice president-operations.

Changes

► **Dr. Merriam** has become special assistant to the senior vice president of Boeing Aircraft Co., Seattle. **Frank Tordella** has been promoted to wing manager of the Indianapolis Products Division.

► **W. Wells Smith** has been appointed manager of Westinghouse Electric Corp.'s Aviation Gas Turbine Division, taking charge of the Kansas City, Mo., and Philadelphia plants.

► **W. B. F. Johnson**, British turbine engine power, is manager of Delta Aircraft Co.'s new Engines Division. Other changes in the San Diego area: **Norm M. Gault**, manager of the Delta F-100 branch of Los Angeles; **William F. Gault**, assistant contract manager; **Frank S. Hays**, Jr., Delta Motors contract manager.

► **Dr. Charles J. Brewster** has joined Lear, Inc., Los Angeles, as director of engineering.

► **Franklin R. Nelson** has been appointed director of research and development for Lockheed Corp., Cincinnati.

Honors and Elections

► **Navy Capt. Charles F. Gell** will receive the John Jeffers Award for aviation medical research from the Institute of the Aeronautical Sciences at the 22nd annual meeting that took place at New York. Other awards: **Harry T. Harrison**, chief aeronautical for United Air Lines, Robert M. Loomis Award for contributions to aeronautics; **Ernest G. Shaw** of Convair, Sylvester Albert Reed Award for research in development of high-speed, very low drag aircraft (see p. 12); **Dr. Donald Colver** of California Institute of Technology, Lawrence Sperry Award for study of supersonic flow motion.

► **James W. Austin**, vice president of traffic and sales for Capital Airlines, has been elected chairman of Advertising Committee for Air Transport Ass'n's Air Traffic Co. branch.

► **G. W. Newman** of Aero, Inc., a new vice president-aviation powerplants in the Society of Automotive Engineers.

(Continued on page 10)



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AVIATION WEEK

VOL. 50, NO. 4

JANUARY 25, 1954

More Aircraft Over Longer Period

'55 Budget Reflects Airpower Stretchout

- \$4.7-billion request is slightly less than '54.
- New plane orders in odds with buildup strategy.

By Katherine Johnson

The \$4.7 billion in new money requested in the President's budget for aircraft and related procurement in fiscal 1955 is slightly less than that for last year's \$4.9 billion.

Here are the amounts, by service, proposed for fiscal 1955 aircraft and related procurement:

• New money asked for the Air Force is substantially down. The \$2.7-billion request for fiscal 1955 compares with \$3.5 billion for fiscal 1954.

• Navy's allocation of new money for aircraft and related procurement is up, however. The \$1.9 billion asked for fiscal 1955 is \$300 million more than the \$1.6 billion for fiscal 1954.

The low request made for ending new planes appeared to be at odds with the spirit of the President's budget message, which stressed airpower as the key to the Administration's new defense strategy.

► **Figure Size**—This budget is aimed at providing a strong military position which can be maintained over the extended period of money pinches toward the creation, maintenance and full exploitation of modern airpower, the message stated.

Request of the \$39.3 billion total accommodated for the three services, however, is for the Air Force. This total (which does not include money for public works) is divided among the services:

- Army, \$5.2 billion.
- Navy, \$5.9 billion.
- Air Force, \$18.2 billion.

The \$11.2-billion total USAF budget proposed for fiscal 1955 appears more the fiscal 1954 total of \$11.4 billion, which includes more than \$200 million for public works.

Naval Aviation's total budget of \$2.0 billion proposed for fiscal 1955, however, is substantially more than the \$2.4 billion for fiscal 1954.

The President's budget declares that a major effort will be made to build down spending on aircraft and

Proposed Airpower Allocations for 1955

Under President Eisenhower's proposed budget, this is how the services plan to allocate funds in selected aviation categories in the 1955 fiscal year, which starts July 1, compared with previous years.

	1951 Fiscal (actual)	1954 Fiscal (actual)	1955 Fiscal (proposed)
Aircraft, engines, parts, ground crew	\$2,571,274,817	\$3,618,086,498	\$3,945,641,500
Ground service personnel	243,289,258	243,499,741	266,512,860
Industrial mobilization	3,875,150	13,479,934	15,000,000
Aircraft and maintenance equipment procurement	408,891,446	441,236,509	401,191,000
Training equipment procurement	21,641,873	79,162,205	35,100,000
Research and development	491,363,914	332,643,380	415,000,000
This includes:			
(a) Research	46,721,503	64,699,975	57,733,000
(b) Ground studies	129,723,584	94,747,676	95,716,000
(c) Proposals	81,933,549	77,990,144	84,276,000
(d) Aircraft	71,446,391	67,364,862	72,643,000
(e) Personnel	26,499,146	76,146,666	35,156,000
(f) Equipment	21,464,342	10,251,119	23,021,000
(g) Systems	49,413,914	43,360,506	32,629,000
(h) Locustory operations	12,738,440	12,977,474	17,718,000
(i) General projects	56,242,927	65,217,308	48,110,000
(j) Locustory operations	137,875,694	181,675,116	114,680,000
Contractual construction	744,568,318	825,411,346	298,400,000

Naval Aviation

Aircraft, engines, parts, procurement	\$2,971,223,186	\$1,977,891,715	\$1,886,000,000
Ground service and budget share	114,681,446	141,952,000	40,500,000
Ground service training	12,416,861	16,077,608	16,000,000
Training equipment procurement	7,275,281	10,979,608	6,500,000
Aircraft mobilization	16,166,315	51,315,000	46,207,000
Research and development	173,891,551	157,715,000	157,190,000
Technical mobilization	6,661,180	2,610,000	5,541,000

Army

Aircraft and ground service	\$2,561,411,556	\$1,944,675,000	\$1,990,000,000
Air defense and research and development	33,875,475	36,668,000	28,518,000

related procurement which means shrinking unit production.

► **Spending Pulse**—Air Force spending on aircraft procurement for the fiscal 1955 year is set at \$6.7 billion, compared with \$6.9 billion for the current fiscal year. Last summer, the House Disposition authorized USAF procurement spending would go up to \$8 billion in fiscal 1955. USAF now has \$20 billion in unexpended procurement funds.

Naval Aviation spending for aircraft

and related procurement is expected to increase to \$2.45 billion in fiscal 1955 from an estimated \$2.4 billion in fiscal 1954.

Other budget highlights: • **Machine Tool Money**. No new money was asked. The Administration asked \$200 million for fiscal 1954, but largely because Defense Secretary Charles Wilson was unenthusiastic about the program to build up the industrial machine tool base, it was trimmed by Congress to \$750 million. The budget shows

Funds for Airpower

Money Requested

	1955 Fiscal	1954 Fiscal	1953 Fiscal
Air Force	\$21,891,670,000	\$11,415,086,000	\$11,396,000,000
Navy	8,813,043,000	2,322,000,000	2,758,000,000
Total	\$30,704,713,000	\$13,737,086,000	\$14,154,000,000

Expenditures

	1955 Fiscal	1954 Fiscal	1953 Fiscal
Air Force	\$20,767,840,000	\$11,444,000,000	\$12,174,000,000
Navy	\$1,111,129,979	\$1,828,000,000	\$4,000,000,000
Total	\$21,878,970,000	\$13,272,000,000	\$16,174,000,000

Aircraft and Related Procurement

Money Requested

	1955 Fiscal	1954 Fiscal	1953 Fiscal
Air Force	\$12,684,902,000	\$3,893,000,000	\$2,790,000,000
Navy	3,930,042,000	1,579,000,000	1,967,000,000
Total	\$16,614,944,000	\$5,472,000,000	\$4,757,000,000

Expenditures

	1955 Fiscal	1954 Fiscal	1953 Fiscal
Air Force	\$6,477,840,000	\$6,990,000,000	\$6,798,000,000
Navy	2,107,095,000	2,480,000,000	2,425,000,000
Total	\$8,584,935,000	\$9,470,000,000	\$9,223,000,000

Civil Aeronautics Administration

Following is a breakdown of the \$183.6 million the Administration requests for fiscal 1955 for CAA and CAB.

New Money Requested:

	1955	1954	1953
Salaries and expenses	\$145,574,000	\$104,945,000	\$76,450,000
Establishment of an inspection facility	13,900,000	7,800,000	5,000,000
Technical development and research	1,025,971	716,000	190,000
Feasibility study program	14,331,314		
Legislation of contract enforcement	9,600,000	22,700,000	
Individual airport program			
Maintenance and operation of Alaska public airports	413,294	326,000	600,000
Air navigation development	1,750,000	1,685,000	1,661,000
Maintenance, operation, construction			
Washington National Airport	1,770,000	1,750,000	
Class, Federal Airport Act	1,531,415		
Total, Civil Aeronautics Administration	\$149,632,641	\$135,626,000	\$79,835,000

Civil Aeronautics Board

	1955	1954	1953
Salaries and expenses	\$1,500,000	\$1,777,000	\$1,776,000
Payments to air carriers	40,490,250	73,000,000	
Total, Civil Aeronautics Board	\$41,990,000	\$74,777,000	\$1,776,000

of the two services in fiscal 1954 of \$830 million will drop to \$526 million. Research and development programs of USAF and Navy Aviation will be substantially curtailed. The estimated total obligation of \$690 million this year will be reduced to \$576 million in fiscal 1955.

Civil Aviation—Increasing emphasis on air transportation responsibilities of the federal government in civil aviation, reported by Aviation Week (Dec. 14, p. 18), as a principal theme in the fiscal 1955 request.

Civil Aeronautics Administration requested \$147.7 million less for 1955 than in fiscal 1954. Civil Aeronautics Board's request for 1955 was about \$12.5 million over 1954 for air carrier subsidy payments.

CAA expenditures in fiscal 1955 are estimated to be \$17 million less than in 1954 and \$40 million less than 1953.

Re-evaluation Aided—Increasing emphasis of the industry requests through re-evaluation of the government's responsibilities of the federal government, the President said in his message.

"With growing maturity, the airline and aircraft industries should assume increased responsibility for air traffic, improved procedures of traffic control, elimination of obsolescent facilities and maintenance of low cost services should permit an expanded volume of air traffic to be handled safely with reduced federal expenditures for operating programs.

In addition, the time has come when consideration should be given to reducing the costs of the various facilities to drive the Air Commerce Week Nov. 2, 1953, p. 71) of providing this service."

Mail Subsidy Taxation—A request was made for \$5 million to permit further work on transportation aids.

Feasibility completion of current studies, no provision is made in the budget for additional expenditures for grants to state and local governments with their airport construction, "Bimonthly and."

Transferring the subsidy portion of annual payments from the Postmaster General to the Civil Aeronautics Board makes it possible for the first time Congress to consider this subsidy and to authorize, as a separate budget item. For both 1954 and 1955, these subsidy payments are estimated at approximately \$80 million, based primarily on existing route patterns and mail rates.

The subsidy expenditures were included in the Post Office Department through September 1951. The separation of civil aviation subsidies, which remain in the Post Office, from subsidy payments is a necessary first step toward a more effective review of expenditures for civil aviation as well as for the post office.

Lockheed Shifts New Missile System Group

Burbank, Calif.—Lockheed Aircraft Co. is transferring its new Missile Systems Division to its company's Van Nuys, Calif., location.

Lockheed jet engine operations are being shifted from Van Nuys to Burbank, Calif., partly as a result of public complaints about operation of jet engine test cells (Aviation Week Sept. 25, 1953, p. 22).

Engineering Chief—The company also has named appointment of William H. Dickson as chief engineer of the new Missile Division. Formerly chief engineering design engineer of Lockheed's California Division, Dickson has been in charge of jet engine aircraft research for the past five years. He joined Lockheed in 1937 as a designer on the Model 10 and the P-18.

The Missile Division, formed last month, has been headquartered at Lockheed's Burbank plant. Shop work already is under way at Van Nuys, and the division's management and engineering staff will move to its temporary headquarters there as facilities become available.

Edward R. Gossard, division vice president, says the move will be completed by July 1.

Reorganizing Elements—When the division was formed in November, Lockheed President Robert E. Gross reported that "important recent developments" made it desirable to reorganize elements of the various departments into one division which can expand at rate into all forms of missile systems research and development.

The Lockheed announcement carefully distinguishes between jet engine, aircraft and guided missiles. The new division will work in the design, development and production of both.

Lockheed maintains three other departments in the Missile Systems Division: I. H. Carter, manager of engineering experimental design; H. J. Shivers, director of structural operations; and H. M. Foster, director of industrial relations.

AA Sets 3.3-Billion Passenger-Mile Mark

American Airlines, flying 33 billion passenger-miles in 1953 for a 13.2% increase over the 2.9-billion total of 1952, became the first domestic air line to top the 3-billion-mile mark in one year.

American's total accounted for 37.3% of the total compared with 33% for 1952. American's passenger-miles increased 6.5%, while scheduled freight tonnage increased 7.3%.

Aircraft Industry Holds Bulk Of Military Contracts

U. S. companies with the largest volume of military contracts in 1953 are aircraft manufacturers in comparison with other defense contractors. Their total hold more than 42% of the total of \$96,723 million in military contracts awarded from July 1950 through June 1953.

Following are firms engaged in aircraft or related production included in the Defense Department's listing of the 100 companies with the largest volume of military contracts:

Rank	Firm	Volume of contracts (in millions of dollars)	Percent of total military contracts
1	General Motors Corp.	\$7,474	7.3
2	Boeing Aircraft Co.	4,632	4.4
3	General Electric Co.	1,419	1.6
4	Douglas Aircraft Co.	2,087	2.6
5	United Aircraft Corp.	2,187	2.8
6	Chrysler Corp.	2,199	2.2
7	Lockheed Aircraft Corp.	2,132	2.2
8	Consolidated Vultee Aircraft Corp.	1,977	2.1
9	North American Aviation	1,991	2.0
10	Republic Aviation Corp.	1,477	1.9
11	Chrysler Corp.	1,746	1.7
12	Ford Motor Co.	1,684	1.7
13	American Telephone and Telegraph Co.	1,491	1.5
14	Westinghouse Electric Corp.	1,345	1.3
15	General Aircraft Engineering Corp.	1,194	1.2
16	Northrop Aircraft	969	1.0
17	Boeing Aircraft Corp.	940	1.0
18	Sperry Corp.	921	0.9
19	Kaiser Motors	907	0.9
20	McDonnell Aircraft Corp.	897	0.7
21	Glenn L. Martin Co.	859	0.7
22	Hughes Tool Co.	832	0.6
23	Rockwell Corp.	821	0.6
24	Reid Aircraft Corp.	804	0.5
25	Avco Manufacturing Corp.	415	0.4
26	General Tire & Rubber Co.	440	0.4
27	Packard Motor Car Co.	437	0.4
28	International Telephone and Telegraph Corp.	410	0.4
29	Pratt & Whitney Engine and Airplane Co.	371	0.4
30	Continental Motors Corp.	299	0.3
31	Boeing Aircraft Corp.	216	0.2
32	General Tire & Rubber Co.	200	0.2
33	Pennsylvania Electric	209	0.2
34	Shuman Manufacturing Co.	187	0.2
35	Griffith Brothers	118	0.1

Load factor dropped from 72.5% in 1952 to 57.7% for 1953. American reports the decrease resulted from increase of 21.4% in passenger capacity, measured in seats.

Aircraft Change—Increased capacity stems from introduction of DC-7s, conversion of some DC-4s from 54-passenger standard configuration to 56-passenger aircraft plus increased utilization.

Aircraft continued to show biggest gain of all categories of traffic, with an increase of 36.5%, rising from 45,598,000 ton-miles in 1952 to 54,678,000 in 1953.

Mail ton-miles remained virtually the same, 17,560,000 in 1953, compared with 17,544,000 in 1952.

Mail Express—American also increased mail ton-miles and tonnage between New York-Chicago, Washington

Change in the Post Office Department reported that began on Oct. 6, 1953.

The carrier also cut up a trail of 10,282,000 ton-miles in Air Express shipments, an increase of 5.5% over 9,618,000 in 1952.

Operating factor also improved in American completed 95.5% of its scheduled flights, compared with 97.1% in 1952.

Douglas Studies Copters

Douglas Aircraft Co. is investigating commercial possibilities of building a light helicopter to replace its DC-3, may produce a 40- to 60-passenger jet-borrowing design of studies show it is economically suitable for local service routes.



Sikorsky HO4S, which will be available to airlines as a 35-seat transport later in 1976, is Marine Corps' latest assault copter.

Sikorsky Offers HR2S Copter to Airlines

By Robert Hott

Building, Com.—A major step in helicopter progress was revealed last week by the Sikorsky Division of United Aircraft Corp. with the first public showing of its twin-engine HR2S.

The twin-engine copter, featuring a single free-blade rotor, is about the size and gross weight of a Douglas DC-3 and is expected to permit a new era in both military and commercial helicopter operations. Its dual propellers

• **Military.** Marine plan to use the HR2S as an assault transport in their new fleet of vertical assaultcraft. Marine use demands up to 200 in. at a speed of more than 190 mph. It also can carry a 105-mm howitzer and up to three light-weight troops.

The HR2S will carry two squads (26 men) of combat troops. Marine use demands up to 200 in. at a speed of more than 190 mph. It also can carry a 105-mm howitzer and up to three light-weight troops.

Army also is interested in the HR2S as both an assault transport and a combat transport and a combat transport to further development of this type.

• **Commercial.** Sikorsky sales manager J. E. Repley sent a letter to the airlines last week announcing that the S-55, a commercial version of the HR2S, would be available for delivery late in 1976.

The S-55 would eliminate some of the purely military features of the HR2S—such as folding tail, integral cargo loading equipment and climbable main rotor. It probably will handle a



TWIN-ENGINE HOES on other side of fuselage, house 1,900 hp. T6W4 R2500

comparable load of 15 passengers over the same range and speed as the military version.

• **Stress.** Bell-Sikorsky is building a new 500,000-sq-ft plant in Stratford, Conn., to handle production of military and commercial versions (Aviation Week Nov. 9, p. 11).

The new plant will double Sikorsky's production facilities and add about 1,000 employees. It also will give the division an opportunity to make a flying bid to compete its current leadership in the helicopter transport field by continuing production of commercial S-1B passenger S-55s and offering

air delivery in quantity within four to six months of order dates.

Originally, Sikorsky planned to phase out the S-55 this year to devote its plant to HR2S production. Now the new plant will continue production on commercial S-55s and a new Navy anti-submarine warfare version of the design known as the S-56.

• **Transport Features.** The new Sikorsky helicopter is about 60 ft long and has a gross weight of 28,500 lb. It features a transport-type fuselage that allows virtually unobstructed middle-cabin cargo for its entire length. All wing-folding, space-consuming equip-

ment has been housed outside the main rotor in flight and has an alternate power source and fuel to insure the aircraft's survival.

• **Rotational speed.** The HR2S has two 2,500-hp engines. The two 2,500-hp engines are mounted in external pods that also house the main landing gear assemblies when retracted.

• **Mounted at Angle.** The main rotor assembly allows free blades of about 45-ft length manufactured by a process described in Aviation Week (Sept. 14, 1975, p. 11).

• **Engine installation.** It is one of the most difficult yet tackled in a helicopter. The HR2S double-engine pods are mounted at an angle to the main fuselage with the combustion pointing toward the main rotor assembly. Cooling air comes in through a duct in the landing gear of the stub wings has to be turned through 135 deg to reach the engine cylinders.

The R2500 normally rated at 2,500 hp but was derated to 1,900 hp for the HR2S installation. At a number of other places no more than 1,725 hp is being used from each engine due to cooling and greasing problems.

Both engines transmit power to the main rotor and the free-blade tail rotor that is almost as large as the main rotor in early model helicopters. Flight characteristics of the HR2S with a 5,000-hp potential indicated that even with the power limitations imposed by certification problems this helicopter has a performance. The HR2S has a single-engine performance.

• **Design Features.** Almost every other major design feature of the HR2S:

• **Retractable main landing gear** that folds into the rear portion of the engine nacelle. Tail wheel extends but does not retract.

• **Folding rotor blades** and tail assembly for landing short of most carrier elevation and storage on larger decks. The rotor hub and main rotor hub must be set in a cradle on the deck space of the main fuselage.

Folding segments of the main rotor involve positioning the blades with the main rotor hub on the deck. The main rotor hub is mounted on the deck. The other two blades fold back into the main rotor hub with the two main rotor blades during in- and out-of-the-deck operation.

Hydraulic folding system is operated from the cockpit.

• **Stub wings.** There are two sets of stub wings on the HR2S. One supports the engine nacelles and houses engine drive equipment and the engine air intake.

A large flap-type moving surface has been designed into the stub wing. The second stub wing looks much like a conventional stabilizer on conventional

aircraft. It helps to unload the main rotor in flight and has an alternate power source and fuel to insure the aircraft's survival.

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Comet Crash Theory: Fuel Blast

Explosions of air and kerosene vapor in partially filled belly tanks seen as possible cause of two accidents.

By Ned McKinnick
(McGraw-Hill Staff Writer)

London—A theory that explosions in partially filled belly tank tanks were the cause of the British Overseas Airways Corp. Comet crashes of Elba and in Calcutta is being backed by British aviation circles.

The theory could hold up if current tests that the Comet's main cabin is the cause of the Elba crash is disproved.

The two crashes had three significant common denominators:

• Both occurred without warning shortly after takeoff while the planes were in their climb. In both cases, all clear signals had been received by airports from which each had taken off.

• Both jet transports involved were in top of performance when the Comet 1's disassembled stage lengths. Rome to London is 900 mi., Calcutta to Delhi is about 700 mi.

• In both cases, the belly tank (in Comet 1, 4,000 gal.) was not utilized, since for both runs concerned there was more than adequate reserve fuel without it.

The theory—These facts have led observers to wonder about the possibility of an explosion in the belly tank. Investigation in the Calcutta crash on Aug. 2, 1975, has shown there is little evidence to support this theory.

But medical evidence gleaned from the 15 bodies recovered from the Jan. 10 crash at Elba tends to support the

view held before the Comet hit the water (Aviation Week Jan. 15, p. 16).

• All involved crashed lower limbs.

• None showed signs of facial distortion or burns, which might have indicated severe burning of the fuselage.

• **Danger Point.** The Comet's kerosene fuel has been explained by the British to be more stable than aviation gas. It is more stable on the ground and at the Comet's cruise altitude of 40,000 ft. But in between, the fuel goes through a danger zone of temperature and pressure.

According to Shell Petroleum, Ltd., the flash point of kerosene at sea level is 130C (266F). At the Comet's cruise altitude, these would not be enough oxygen to make an explosion likely. But at 35,000 ft, the flash point drops to around 140C (284F) and there is enough oxygen to form an explosive mixture.

In the Calcutta crash the Comet was estimated to have been at about 35,000 ft when it broke up.

Crash investigators estimated 25,000 ft. In Calcutta, ambient temperature on the ground was estimated at 30C (86F) and there was considerable cloud cover. At the Elba crash at 35,000 ft, the ambient temperature was estimated to be 5C.

• **Fuel Level.** In both cases, level of fuel in the belly tank would have been such as to allow for potentially explosive conditions if an explosion occurred.

The question was: temperature of the fuel in either or both cases high enough to cause an explosion? It was not.

CAO Accounts Administrator Fred

Lee outlined this danger as a speech last May before the Airport Operations Council in Kansas City.

"Kansas City is big," Lee said, "you have explosive materials at all levels. This will require special measures to prevent hazard from lightning strike and other sources of ignition."

► **The Headland View**—A spokesman for de Havilland, builder of the Comet, told AVIATION WEEK that a situation theoretically is possible. But he pointed out that repeated transportation to make the fuel explosion at only level of risk had been well above anything the Comet assembly could be expected to encounter.

Location of the belly tank between main sections of the jet liner's center wing section is thought adequate against fuel transfer from any adjacent parts of the fuselage, he said.

Only recovery of the wreckage of the Elba crash from the bottom of the Mediterranean can throw more light on this theory. Degree of damage seen in the Colorado crash, plus the blurring effect of evidence loss, have made confusion in this instance difficult to find. The Royal Aircraft Establishment at Farnborough has had the recovered Colorado wreckage under study for more than eight months.

► **Canal Fleet Again**—Mexico City, one of the six grandiose El Cometa's, seemed new training flights last week after investigation had failed to disclose any signs of structural weakness. The company grounded the Comet after the Elba crash Jan. 16.

The company hints the planes will be authorized to full service shortly if no new evidence on the Elba crash comes to light. But the fact is the decision to resume commercial service is up to the Minister of Transport, not RCAF. And currently, the weight of technical opinion is heavily in favor of keeping the Comet grounded a while longer.

Sir Miles Flannery, chairman of the

inquiry, confirms the general impression that some sort of explosion occurred on the Elba crash. This has given rise to much talk of sabotage, but crash investigation are not nearing the end.

Preparations are being made by the British Navy to salvage the Elba wreck, says Elcom. Exact location still is not definite, but fresh air water on the sloping rim had indicated the wreckage will be difficult. And there is no obvious large pieces of the aircraft still on orbit.

Air Academy

- \$175 million to be spent on USAF institution.
- First class expected to enter school in 1955.

Establishment of a U. S. Air Force Academy, located for years by juggling out its location and economy process, now seems a certainty.

House Armed Services Committee, 26 to 1, approved legislation authorizing it and an initial \$25 million appropriation. The total cost now is estimated roughly at around \$175 million. The only bottleneck now is project in House Appropriations Committee, whose chairman, Rep. John Taber, is inclined to limit the initial outlay to \$5 million.

► **Military Keynotes**—The academy has the solid backing of the President and defense leaders. Congressmen appear agreed not to make its location an issue, although behind the scenes pressure from localities and state delegations can be expected. Under the authorizing legislation, the decision on site would be made by the Secretary of Air Force after a study of all possibilities.

"Anytime is the best time if we all stay strong," Deputy Secretary of De-

fense Roger Kyes testified. "In any operation, the cost must be weighed against the potential return to the service. It is our belief that the return in future leadership will repay the cost of an Air Force academy many times over.... We are convinced it will increase greatly dividends from our overall defense investment."

Air Force Secretary Harold Talbot pointed out that "we are the only nation which does not have an institution for the specific purpose of training its Air Force officers in defense of our own expert to our national security."

Army and Navy are giving full backing to the Air Force academy. USAF now intends about 375 of its ranks of first-class men through a 2,500 allotment of the graduate of West Point and Annapolis. None of the services has been satisfied with the average.

► **Sites Considered**—Air Force plans to start off a temporary academy, located at an existing or base near the site for the permanent academy. The first class of 300 would enter in July 1955, and the second class in July 1956. By July 1957, it is hoped construction of the permanent academy would be far enough along to transfer these two classes and enter the third class there.

USAF expects eventually to enroll 600, or 50% of all general grade of career military officers from the academy.

The seven locations considered most desirable by a former study group, whose findings Talbot will weigh, were: Crown Point, Calif., near Marinville; a site near Colorado Springs, Colo.; a site near Madison, Ind.; a site near Charlotte, N. C., and near Greenville, Georgia County, and Randolph AFB, Tex.

AF, Navy Aircraft Obligations Lag

Air Force and Navy obligations for aircraft and related personnel lagged in November, fifth month of the current fiscal year, Defense Department reports.

USAF obligations during the month totaled \$171 million and Navy obligations \$11 million.

For the full November period, obligations totaled \$172 million, \$505 million by USAF and \$507 million by Navy.

On Dec. 1, the two services had more than \$2.5 billion in unobligated funds for aircraft and related contracts. That means they would have to arrange obligations out of more than \$1 billion a month, about twice the total for the first five months, for the following seven months to equal the balance by July 1, end of fiscal 1954.

They said
he was
too young...



Aviators of world renown had studied the project for years. They favored elaborate equipment, and crews of two or more. They were skeptical when, in February 1937, they heard of the plans of a certain single-minded young man from Missouri.

He made it in May—alone. The man they said was "too young"—the man who had never navigated over the sea... landed two tons of fuel into an unimpaired plane and took off from a soggy field near New York. He had a compass and a pack of sandwiches. Thirty-three hours later he landed in Paris. Making history.

In a young industry, Youth is a priceless asset!

Hydro-Aire, too, is young, but its youth is crowned with achievement. In less than a decade Hydro-Aire's standing in the Aviation Industry is such that today every fighter, every bomber, every transport is Hydro-Aire equipped. Actuators, Hot Air Valves, Fuel Valves and Filters produced by Hydro-Aire have been in worldwide service for years. Next came Hydrol, now being powered by major airlines, and the revolutionary new HY-V/L* Fuel Booster Pump. At the present time Hydro-Aire's great research know-how, backed by enormous resources and the energy and enthusiasm of youth, is repaying new blood into Turbo-soundby development.

Hydro-Aire welcomes your problems. Please take us up on this. Few prospects are too large—none is too small—for the money, research facilities of Hydro-Aire.

Hydro-Aire
INCORPORATED

*High Vapor/Liquid Ratio



First View of New Percival Jet Copter

A prototype of the jet-powered eight-passenger helicopter directed alone in model form is being built by Percival Aircraft Ltd., under the designation P. 74. Plans will be a Navajo helicopter, but pressure work. Only data available at present.

on the P. 74 show that it will have a gross weight of 3,200 lb and disposable load of 1,500 lb. Cabin is divided into two sections, one with forward-facing seats, the other having forward-facing seats. Craft has three blade rotor.

HYDRO-AIRE
INC.
IRVINE, CALIF. • Subsidiary of Crane Co.



ON THE BEACH, Coast's R3Y Tradewind transport shows off its slow ball, towing tugboats (at tail) and water-skiing properties.

R3Y Flight Signals New Seaplane Era

By William J. Connelley

San Diego, Calif.—When the Navy begins flying its new Convair R3Y water-based transport on the Pacific coast, it may signal to some coastal airlines and airports across the state that a new era for seaplanes has arrived.

It has become customary to think of water-based service in terms of the lumbering Clippers that blazed the Pacific or the slow Navy flying boats, which dot the Alaska, Calif., to Honolulu or New York.

But the sleek turbo-propelled R3Y Tradewind—scheduled to make its first flight Feb. 15—will outstrip any other aircraft carrier flying from the coast. Only when the DC-7 begins operating to Hawaii will the airlines have a plane comparable in speed to the Navy's new cargo passenger aircraft.

► **Efficient.** Legend has it that the R3Y was designed to meet the world's lines of aerial commerce for years due to the ability to provide unexcelled economy, comfort, versatility, dependability, and above all safety, says Coast's hydrodynamic engineer, Ernest G. Stout. "Lacking one momentary expenditure—these other inherent qualities were recognized as factors of the better handling."

Thanks to development of the high speed blended hull design with its high-length cow horn entry, water-based service now have overcome their lack of speed, Stout points out.

"Water-based aircraft have completely closed the gap in relative speed between the seaplane and the land plane," he says.

► **Traffic.** Seafair—When Coast launched its first project R3Y 1 for two seats on Dec. 17, it called the

Tradewind the first new aircraft introduced during the second half century of powered flight (Aviation Week Dec. 25, p. 35).

Its significance may be even greater than that. If Coast's hydrodynamic group is correct, the Tradewind may mark the beginning of a development in air transport that, while still in distant, is inevitable.

The R3Y's bubble below this new seaplane and its proposed nacelles could be the solution to cramped airport facilities and crowded traffic patterns.

They have heard the arguments about overcrowded harbors and the folly of emergency flights in water-based aircraft, and they have the answer for them.

► **Commercial Conversion.** No airlines are looking at Coast's door yet, but a commercial version of the R3Y, but the company has underway a study of commercial possibilities at the new water-based transport for passengers and freight.

A look at the interior of the new Navy aircraft indicates it would be converted easily for airline use. The Tradewind has a "new look" for airlines.

Its spacious comfortable main cabin (on seat 8) or some portion can be used for cargo. The Navy plans to use it for both, fitting it with convertible seats for passengers.

The cabin is free of the small bulkheads and other obstructions. This is made possible by the fact that water-tight bulkheads blocking the hull off into many cells extend upward only to the floor level.

The multifloor arrangement serves a double purpose.

► **Float deck.** Landing is provided in the event of forced landing at sea. If the emergency landing is caused by

main engine failure, repairs can be made at sea and flight resumed.

In the event of a major emergency, the water-tight compartments will keep the aircraft afloat until passengers and crew are rescued.

► **Rugged construction.** Also provides emergency protection for passengers if the aircraft is forced down on land.

"On emergency landing it is a good practice for a landing to make an emergency landing with the aircraft inverted," says Stout. "The high bottom of the seaplane, particularly when equipped with water-tight compartments, gives excellent crash protection in such emergency."

All principal areas of the Tradewind are equipped with high altitude parachutes and air conditioning.

Aboard of the single-deck passenger cabin is the first compartment of the crew's quarters, with three bunks, galley, clothes locker, flight equipment's storage and a storage up to the pilot's and co-pilot's deck.

Forward of the crew's quarters and on the same level is the navigator and radio operator's compartment.

► **Pusher Tradewind.** The R3Y has a wingspan of some 145 ft., is 142 ft. 6 in. long. Height of its towering nose is 31 ft. 6 in. when on a beaching cradle.

Coast reports that the Tradewind's speed with two Allison T-44 turbo props is more than 350 mph and far exceeds better than that of World War II fighter aircraft.

New accuracy prevents disclosure of most exact performance figures.

Several more operational experience with the Tradewind will be necessary before commercial feasibility is determined. The Navy is effecting a leasing the development costs of a possible commercial carrier or air cargo plane.



IN THE WATER, Navy's cargo-passenger seaplane reveals lines of its highspeed, blended hull design with high-length-over-bow ratio.

"Airlines can't afford the development costs," says one Coast executive. "I think that is the only reason they are not doing anything now."

► **Insurance.** Edge-like question to be answered, of course, is that of economics.

Coast believes the cost of building the Tradewind could be approximately the same, priced for profit, as a commercial aircraft of comparable capacity.

"On this one," says Stout, "the seaplane gives the lowest operating cost. The R3Y should therefore operate at a substantially lower fare/mile cost than its on-land powered competitors."

A Coast designer estimates that the cost per ton/mile for a 150,000-lb aircraft with jet engines will be the same whether it is land-based or water-based. But in the sea instance, the economic margin favors the seaplane.

The odds "Seaplane potential has taken a rapid acceleration. It is not yet ready to realize that potential because of the lack of experience and demonstrated success. But as it shows it has regained its professional development and is used for operational purposes by the Navy, its utility will become evident. There people can figure out its commercial uses."

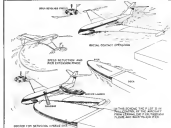
► **Airframe Potential.** First commercial use of the new water-based aircraft may be for freight, rather than passengers. Water airports become congested with jet transport traffic, the first aircraft to be driven out of the traffic pattern will be freighters, says Coast's planner J. R. DeLong.

"The cargo potential for water-based aircraft is huge," he points out. "While passenger facilities would have to be developed, the cargo investment for freight already has been made."

"Waterways are infinitely in close to the waterfront and docking berths already are available. We haven't



JET SEAPLANE design, based on Coast, changes transport's appearance very little.



AUTOMATIC DOCKING of water-based seaplane is shown in silhouette layout.



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Convair Answers on Sea-Based Jets

San Diego, Calif.—Here are some of the questions frequently asked about water-based jet transports, together with Convair's answers.

• **What about water being at sea level and later used by water-based transports?**

This would be a problem, but even a runway has to be kept clear of ice and snow. Comparable equipment could keep a lake surface clear.

This is only part of the problem anyway, since approximately 70% of the world's commerce is in the temperate zone.

• **What about harbor traffic or submerged floating objects in the landing area?**

Harbor traffic would be less of a problem for water-based jet transports than for traffic for land-based. Maintenance equipment could keep landing areas free of submerged objects at a lower cost than maintenance of conventional airports.

The high bottom pressure on rollers built automatically prevent all but very large objects from ever coming in contact with the bottom

The very large objects can be seen and avoided.

• **What about the safety factor in flying water-based jet transports over land areas in a flight from Los Angeles to New York?**

Safety is proven, not less. There are almost no seas in the United States where a water-based aircraft would be out of reach of an emergency water landing zone.

In the type of emergency landing in which a land-based aircraft would get down wheels up, the water-based aircraft would give much greater protection to the passengers.

And speaking of safety, look at the margin in favor of airplanes in transoceanic flight.

• **Who will take the necessary for building terminals for water-based aircraft?**

This is a problem yet to be decided, but even out of a water-based airport, it may be less of a financial strain than the building of new airports or even the expansion of existing ones.

even topped the surface of its cargo jet and this option is compatible for water-based aircraft.

• **Best Design**—That is the future that faces the jet airplane, whose design must begin here in San Diego in 1951 when Glenn Curtiss made the first jet-powered flight.

Curtis designed his jetliner aircraft as an airplane that would float. But it was not long before water-based aircraft became based down in a design philosophy that eventually almost brought their extinction. What started out as an airplane that would float soon became a boat that would fly.

Engine design that fell into the realm of naval architecture and gradually dropped behind in the jet age.

Water-based aircraft needed their peak in the 1930's when Sikorsky, Martin, Boeing and Convair flying boats were producing water jet liners. But it was the turbo fan speed, then turbojet engine that began to fill farther and farther behind.

With the advent of the jet engine, the flying boats were out of the running entirely. Their high drag characteristics made it impossible for them to utilize turbojet engines effectively.

• **New Philosophy**—Then came the birth of the new design philosophy, which was to make a new life for water-based aircraft. Supersonic and cruise designers, should not be held with

wings but airplanes that could float. Basic aerodynamic configurations must not be compromised in order to achieve water basing.

Among the leaders in this new design is the Convair Division of the Lockheed Aircraft Corp.

After a succession of dynamically similar models and the XP-57 prototype, the first RJV is the first production aircraft evolved from that new design philosophy.

• **100-Passenger Aircraft**—Whether water-based aircraft ever will pass land-based transports in performance may depend on whether airplanes eventually become limited by runway length.

Some Convair planners envision giant water-based aircraft which some day would carry 300 or more passengers in ocean-borne comfort.

"Increase in size is unlimited by engine requirements, a water-based aircraft always can be more comfortable," comments one designer.

With planes of such enormous passenger capacity, the difference in performance would be seen. Multi-engine aircraft would be an impracticality that the few types of aircraft would look almost like a speck in the air.

Short and the other Convair specialists have given a great deal of thought to what the next 50 years of flight hold for this new type of aircraft.

Although the Tiedwater in turbo-

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THREE-VIEW of Comet's hull design

equipment, most of Comet's competitors agree that hull-type looks like the best bet for the new-style seaplane.

With the aid of the jet transport rapidly approaching, seaplanes face many new problems. Current beliefs water-based aircraft may hold the solution to some of these.

Jet Fokker-built big American Airlines executive recently stated reasons the carrier is not only to buy jet transports—important among these were:

- Difficulty of all-weather operation of jets.

- Noise problem.
- Lack of adequate runways.

Else, what Stinson has to say about operation of water-based jet transports in turbulent weather.

Such operation is greatly enhanced by the use of water-based aircraft due to the wide tolerance usually available

Comet Seaplane

To prove their arguments favoring water-based transports over landplanes, Comet's hydroplanners have designed a jet seaplane to the performance characteristics of a Harvard Aircraft Carrier.

Using a streamlined design and retractable spray doors, the water-bombing of the Comet changes its appearance very little.

Jet intakes have been ducted forward into a side entry scoop. Tailfin, exhaust duct and the horizontal tail have been modified slightly. Wing and forward fuselage, payload accommodations, speed and other performance characteristics are the same.

Extra weight of the hull is made up entirely by the elimination of the landing gear and wheel retraction mechanisms.



the PLUS factor

All Beechcraft airplanes are designed and built to possess more strength than is required by government regulations. Beechcrafts have a plus factor which is intended to provide long life for the airplanes and extra safety for their occupants.

The photograph above shows the right wing of a T-34 (Muster) Beechcraft after it hit an aerial cable in a canyon at full cruising speed. The cable did not break, but almost stopped the Beechcraft and spun it around, 350 feet above the canyon

floor. The skill of the military pilot was so great that he was able to regain flying speed and control before reaching the canyon floor. The T-34 Beechcraft trainer was flown back to its base and made a normal landing. Examination showed that damage was confined to the superficial contours and abrasions shown in the photograph.

This is another example of the plus factor in Beechcraft construction.

The Beechcraft T-34 trainer is now in production for the U. S. A. F. and the military services of twenty foreign governments.



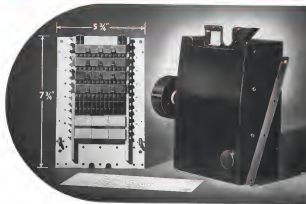
Beechcraft

Beech Aircraft Corporation, Wichita, Kansas, U. S. A.

Bech-Bullitt: C-47A, C-47B, C-47C, C-47D, C-47E, C-47F, C-47G, C-47H, C-47J, C-47K, C-47L, C-47M, C-47N, C-47O, C-47P, C-47Q, C-47R, C-47S, C-47T, C-47U, C-47V, C-47W, C-47X, C-47Y, C-47Z, C-47AA, C-47AB, C-47AC, C-47AD, C-47AE, C-47AF, C-47AG, C-47AH, C-47AI, C-47AJ, C-47AK, C-47AL, C-47AM, C-47AN, C-47AO, C-47AP, C-47AQ, C-47AR, C-47AS, C-47AT, C-47AU, C-47AV, C-47AW, C-47AX, C-47AY, C-47AZ, C-47BA, C-47BB, C-47BC, C-47BD, C-47BE, C-47BF, C-47BG, C-47BH, C-47BI, C-47BJ, C-47BK, C-47BL, C-47BM, C-47BN, C-47BO, C-47BP, C-47BQ, C-47BR, C-47BS, C-47BT, C-47BU, C-47BV, C-47BW, C-47BX, C-47BY, C-47BZ, C-47CA, C-47CB, C-47CC, C-47CD, C-47CE, C-47CF, C-47CG, C-47CH, C-47CI, C-47CJ, C-47CK, C-47CL, C-47CM, C-47CN, C-47CO, C-47CP, C-47CQ, C-47CR, C-47CS, C-47CT, C-47CU, C-47CV, C-47CW, C-47CX, C-47CY, C-47CZ, C-47DA, C-47DB, C-47DC, C-47DD, C-47DE, C-47DF, C-47DG, C-47DH, C-47DI, C-47DJ, C-47DK, C-47DL, C-47DM, C-47DN, C-47DO, C-47DP, C-47DQ, C-47DR, C-47DS, C-47DT, C-47DU, C-47DV, C-47DW, 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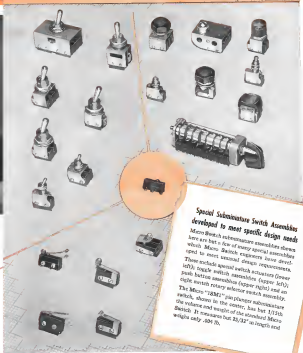
Engineers of Collins Radio Company chose Micro subminiature switches for this important navigation development because they combined size 1 with

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Special Subminiature Switch Assemblies developed to meet specific design needs

Micro Switch subminiature assemblies shown here are but a few of many special assemblies which Micro Switch engineers have developed to meet unusual design requirements.

These include special switch actuators (lower left); toggle switch assemblies (upper left); push button assemblies (upper right); and an eight switch rotary selector switch assembly.

The Micro "7881" pin plunger subminiature switch, shown in the center, has but 1/13th the volume and weight of the standard Micro Switch. It measures but 25/32" in length and weighs only .004 lb.

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from the need for more land for larger runways. As airports are forced to greater distances from the cities they serve, ground transportation delays are cutting up much of the advantage gained by flying.

In a number of cities, water-based transport could reverse this trend. In New York, for example, water-based jet transport could find its long Island Sound adjunct in the Garden City Airport and proceed directly to midtown Manhattan.

Water Transport-Shuttle points out still another advantage of water-based travel. "Local building and population expansion does not close in on these

areas with their demand for a constant of operations in a fairly move to a more remote location."

One of such a water terminal would be considerably less than that of a conventional land terminal, according to Brooks. He estimates that a fully equipped water-based facility could be constructed for \$75 million, compared with \$100 million for a land terminal with equal facilities.

Such a terminal would include passenger and administration buildings, loading and unloading equipment and maintenance facilities such as crane-type railways, floating drydock, and shop equipment.

• **Benching the jets.**—The pilot of an incoming aircraft would taxi into the ramp area between two buoys where, as weather what the wind, he could hook the landing gear.

Then if he was positioned by into same line, he would not his power for heading into a U-turn where passengers would be discharged. There would be no need for boats to come out to help a water-based jet transport, according to Conway experts.

Such a system already has been tested in the design stage.

"Benching of water-based aircraft is no longer a problem," Brooks says, "and even on the beach it is impossible to land based."

• **Simple by Comparison.**—"It is a well-documented fact that some of the difficulties of water-based operation in the past resulted from the lack of efficient docking and handling facilities," comments Blair.

"With the advent of modern airport planning and construction, the design of efficient equipment and procedures for the rapid handling of water-based aircraft appears simple by comparison."

"The necessity for departure of aircraft from busy congested areas is rapidly becoming the rapidly increasing development of specific water-based terminals, and more extensive dockage schemes become to be efficient, reliable and vastly less costly than the elaborate modifications and schemes belonging all modern airport managers today." Automatic control, positive coordination, and rapid servicing can be obtained with proper planning and functional design.

Water terminals are more flexible to changing times and air traffic development, Conway specialists believe point out.

"Does you have a concrete runway, that's where it starts," he says. "But a water base with its public runway makes can be shifted in a few weeks."

In addition, he asserts that the water-based ports offered water-based aircraft will increase the rate of usage of air transportation.

That acceleration of air service in time, will speed up development of related areas where transportation now is a bottleneck.

Japan Copter Shuttle

Bell Model 47D-1 helicopter is flying Japan's first aerial shuttle service between Tokyo's Central Post Office and Haneda Airport, and plans call for steady increases of this capital's inter-city flight schedule.

From Helicopter Transport Co. is requested the service last month, the flying mail from the Post Office and post heliport in Osaka-bound transport at the Haneda field.



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MOVIE SET of ticket counter is used in preparation of PAA's video technique film.

PAA Training Goes Hollywood

By Frank Sheu, Jr.

An investment of over \$900,000 in an extensive employee training program is paying big dividends in increased sales and efficiency for Pan American World Airways, company officials say.

Claimed to be one of the largest single integrated sales attitude and training programs undertaken in any industry, it is a combination of human relations, job attitude development and technique training—designed to give the average employee in PAA's worldwide network a better basic understanding of the company and its operations.

The "text books" of the program are a series of 15 motion pictures, 18 sound slide-films, four perforated card presentations and numerous case history recordings. Employees, organized in groups of 10 to 12 according to duties, study these training aids together and discuss them in relation to their own problems. At least an 10 hours a week are devoted to the program, with classes meeting once or twice a week.

Pan American states that more than 90 stations in its worldwide network are now fully equipped with the aids with more being added each month. Thirty-two of these stations are in Europe alone.

►New Perspective—Upon completion of training, personnel feel that they have a new perspective with relation to their duties, the airline says. And, with increased knowledge of operations of

all facets of their organization, they are able to integrate themselves into the entire PAA operation as a team, efficient, purposeful team, officials believe.

As a sign of the program's value, PAA points to the interest shown in numerous other companies—including two airlines—in adopting similar plans. Spirit and Bonanza-Lia are airlines. Pan American's stock in trade is service. For this reason, the base of the program is people, the people who run the airline—and the people who buy the tickets and ship the cargo that keep it moving.

Through films and other media, these two groups are introduced to each other. Then they are analyzed. Passes go on and prospects are vigorously there upon on the screen, and their problems and desires laid open for the employee to see, learn to recognize and feel.

The employee, too, is thrown up to the screen, making him to get a good clear look at his own problems in dealing with customers. By recognizing and later analyzing them in discussion periods, he returns to his duties better equipped to cope with any situation which might arise, Pan Am believes.

All training periods are run by company officials and include thorough analytical discussion led by employee trainers especially schooled in conference leadership.

The customer patterns dealt with the overall job experience—what it is—who

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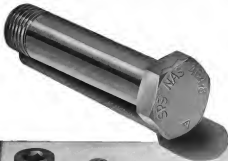
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it effects—and why. Slidefilms deal with materials and approved techniques used on the job, while case histories sometimes review major problems arising from the job. In all cases, solutions are worked out through audience participation.

► **Historical Review**—PAA began its training program with a motion picture reviewing the airline's growth over the past 25 years. Emphasis is placed on the big part played by the average employee.

Another film, "Flight Happy," shows how the cabin crew, by meeting sales as loans and kindness, work together to satisfy the customer. Others present problems from the passenger's point of view and compare the actions in which an experienced counter sales agent handles customers in opposed to a person's agent.

Telephone sales techniques also come in for a large share of attention. "Dial S for Service" shows how satisfactory delays on the part of sales agents cause customer objections and possible loss of sales.

► **Sales Technique**—In its sales approach, PAA employs a technique called "contingency." The prospect is drawn into a case or vacuum, point by point, until sale is made.

The employee is trained first to sell the company—"Always say, 'Pan American,' never 'we.'" He gets the posi-



Missile Briefing

Air Force and Army officials view a model ship showing a typical installation for the new Boeing B-57D Strake fighter aircraft for during a recent briefing of Boeing Airplane Co. Seattle, Wash. Details of the aircraft's design were recently revealed from being shown in the photo. Viewing the installation, left to right: Lt. Gen. J. T. Lewis, Army and chief of staff; Gen. G. W. Chaffin, USAF, commander, Air Defense Command; and Boeing president William M. Allen.



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port a quick, brief description of the type equipment that will be used on the flight in question, and a description of route that the plane will follow, noting whether it is a direct, overnight or alternate route flight. Agents then introduce the postcard-sized service log-forms—such as barbs, stopwatches, maps and dials.

Still following the racing pattern, the agent then assigns his project with what he hopes will be the jolly flourish—a statement on FAA's record involving around the corner's slogan: "World's Most Experienced Author." This is believed especially effective with those who are somewhat timid about flying.

If project is still undecided, agent's training then leads him to cover the course more thoroughly, noting by notes, engineering and going more detailed to actions which he feels are most important to the particular project.

FAA claims that application of this course log technique has paid off appreciably in safety that might otherwise not have been made.

►Flight Zero Thousand—The program's sound slide-film get down to particular cases. How individual attitude and poor, individual service on part of flight service personnel may cause an uncomfortable, uneasy flight is told in not presentation, while another film, depicting the same flight, demonstrates how proper attitude and service result in a thoroughly enjoyable flight. Additional slide films compare right and wrong way to handle passengers who have never flown before.

Even FAA captures interest in their share of attention in the program. A film entitled "Log of A Captain" is designed to stimulate pilot's self-education that in addition to commanding the aircraft, he has certain responsibilities to passengers and flight crew. Film encourages him to recognize passenger problems and to struggle with passengers who attempt to solve them.

►Geography—Recently added feature of the program is a series of courses in geography covering all countries served in FAA's routes. Courses officials admit that they were shocked to find fairly widespread ignorance among pilots as far as geographical aspects of routes were concerned.

An expert in the field was hired to prepare a series of geography studies which would lead down into four main courses of 10 class sessions each. Those of the courses coincide with the carrier's three divisions—Latin America, Atlantic and Pacific/Alaska. Each offers a comprehensive study of all the area, written in layman's language and amply illustrated by slide-film. Fourth course, designed for foreign airways in FAA system, covers geography of U. S. ►Screen Scene—Screen of the entire



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Here's the big, handsome, DC-7—Douglas' latest commercial airplane. This picture shows off the power packages built for the DC-7 by Rohr...world's largest producer of ready-to-install power packages for both commercial and military planes. In addition, Rohr Aircraftmen currently are producing more than 25,000 different parts for all types of airplanes.

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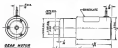
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training program has more than 400 personnel for the capital investment in relief in its implementation—personnel for professional training, distribution, maintenance, etc.—PAA.

"What key to success of the program, however, has been emphasis on PAA's vice president for traffic and sales. And employee movements seem to have been met."

A Houston employee makes this observation: "I feel that our attitude toward PAA, the customer and employee is good. In general, however, I am not sure if this is the only person's point of view."

Another from Tulsa, states: "Our reaction to the program, speaking for myself, and I believe the other supervisory personnel—all about the same thing at this time was satisfied."

► **Bowman**—Similar actions have come from PAA stations all over the world. Bowman to date shows that in the last year of operation the company has been administered to over 1500 all company personnel. In order to accomplish this 710 hand-picked, employee-trainees had had to receive special training in various techniques and use of the time ring.

Approximate monthly of hours per employee spent on training breaks down as follows: 12 S. Sales, 12 per month; Alaska Division, 40 per month; Latin American Division 25 per month; Pacific Alaska Division, 10 per month.

Rheem Buys 30,000 Shares of Northrop

Los Angeles—Rheem Manufacturing Co. has become one of the largest stockholders of Northrop Aircraft with the purchase of 30,000 shares of Northrop common stock.

A Rheem representative will be placed on the Northrop board of directors at stockholders of the aircraft company approve the move.

They have been asked to amend the company's articles of incorporation and to allow to that the number of directors may be not less than six nor more than 12. If the change is approved, one additional director to represent Rheem will be named to bring membership of Northrop's board.

It is claimed to estimate A. E. Westing as the Rheem representative of the entire of the stockholders is favorable. He is a director of Rheem and a vice president and director of Northrop & Co., an indirect member.

Rheem has been active in corporate takeovers and graded traffic flow through its Aircraft Division. A spokesman for Rheem says the investment in one of several of the largest aircraft of such company position plan.

PRODUCTION ENGINEERING



SUPERSONIC DESIGN, this sleekwing delta 50-deg swept delta eight, conceived by British designer Keith Lucas.

How Future's Needs Will Shape Design

Successful supersonic aircraft will depend on meeting new performance criteria with materials and production methods.

The complex nature of design and production considerations following from the move of aircraft speeds into the supersonic range encompasses almost every phase of aircraft engineering, from basic aerodynamic configurations to specific internal details.

An instructive analysis of some of these overall design and production problems, showing how the focus of aircraft engineering has been given by D. Keith Lucas, chief designer, Short Brothers and Harland, Ltd.

► **Four Points**—Delivered before the 19th International Symposium on Rarefied Gas Dynamics, the University of Southampton, England, the analysis considers these aspects of tomorrow's supersonics:

- Aerodynamic details.
- Internal configuration.
- Construction problems.
- Materials.

Aerodynamics

Will the supersonic aircraft of tomorrow have swept wings? This is the first consideration in Keith Lucas' analysis. Peak drag on a straight wing segment at about sonic speed and is considerably reduced by thinning the wing as much as possible. Sweepback not only reduces peak drag, but delta's in comparison with higher Mach numbers.

► **Drag Consideration**—If the design is for speed just above sonic, there is an obvious case for using sweepback to reduce the drag. But, Keith Lucas also notes, the delta, if not so, is at about Mach 2, the amount of sweep required becomes "rather impractical."

Thus, the use of a straight wing for flying at a speed well above the peak drag becomes quite attractive. It claims that the aerodynamic of a perfect aircraft with such a wing results in the wing

is extremely thin—thickness/leading edge of probably only 5:1. This is a serious, he points out, not only because of the enormous drag penalty of thicker wings at such high supersonic speeds, but also because the plane has to push through the peak drag speed.

Other considerations, effects—wing drooping, trim drooping, and buffeting—such a minimum value of about the same speed when drag can occur. Thus, the delta wing, as we studied completely ineffective only with these theories.

The wing, he says, is not much good for design, not even the delta. This makes the engine not to the wing tips and the leading gear, presumably, would have to be located in the fuselage—not a very attractive arrangement.

► **Large-Scale Aerobics**—The alternative to this arrangement, a configuration on having about 50-deg, as sweepback—upsetting something like the delta's in delta—delta very much like a paper dart. Keith Lucas says.

It is an answer, he says, to the swept-wing compromise, leads to off much more advantages than the winging of first—leading gear. But even in this configuration, the wing is still located on the outside because of this, not located in the wing over the fuselage as the long intake and jet pipes would be unacceptable. Keith Lucas contends.

The configuration seems possible—the center of gravity is on about the right place, and longitudinal damping should be good, although the plane may be a bit touchy, he says.

► **Will Increase Sweep**—There is little known about stages of the size and their own, he notes, troubles ahead. Keith Lucas believes. The push out that the second we have it been to the aerodynamic of a perfect aircraft with such a wing results in the wing

the Short Brothers and Harland, Ltd., research plane has 50 deg of sweep. Keith Lucas reveals that 50 deg of sweep is a later stage in this plane. That, he says, should provide useful data even though the plane is in the low speed category.

For long-range aircraft, it is essential that the lifting ratio be as high as possible—only achieved by ensuring a reasonably large lift coefficient. Unfortunatly, the high swept delta plan form has a low slope to its lift curve, so that a large lift coefficient means a large sweep, he says. This means a large induced drag because, at supersonic speeds, the lift vector is normal to the plane of the wing.

Probably, this is the strongest argument against the delta wing. Keith Lucas agrees, but he is still partial to the configuration, mainly because of the small space contained in this type of wing.

Stowage Considerations

Aircraft stowage capacity, already a strong consideration is likely to become even more acute as speeds rise. The designer will probably try everything to reduce aerodynamic volume to a minimum, because the penalty to be paid for unnecessary frontal area becomes so great, Keith Lucas says.

► **More Space**—Needless to say, the aerodynamic of a perfect aircraft with such a wing results in the wing

Another troublesome problem is the increasing amount of equipment that must be accommodated in new aircraft. This poses a number of problems for the production engineer in the final stage. This equipment must be avoided, although good design may

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clearly see the problem at once, Keith-Lucas men.

In the days of the old mouse plane, storage space was no problem—there was almost room to add a lot of equipment. Today we cannot afford to carry all that gear with us, Keith-Lucas claims, and for language operations part of the fuel tank to be carried inside the wing tip as in belly tanks. The other half, where both fuel and oxygen are being carried.

The next step in the refinement process is to eliminate stress. Keith-Lucas says he would like to start with the landing gear, but that after that it becomes a difficult choice. Reinforcing

two and simplification of equipment is probably the most fruitful field, he says, but the problem deserves real careful thought.

Construction

One structural design consideration is that not only must the structure be light, but it must also absorb the maximum of usable space inside the wing and fuselage.

Integral construction in language with this requirement, Keith-Lucas examines integral construction. He gives as an example a reinforced skin to carry a skin-stringer construction and compares it with the conventional skin-

stringer bulk-up construction. The integral approach, he says, gives a saving of 15% on the weight of the component and, in production, the cost is estimated to be about 35% below the integral. Weight saving results mostly because the skin and stringer are continuously tapered and because no weight is brought in through joints.

He cites another reported advantage—that if the gross weight of the phase increases, the structure can be increased to suit merely by changing the depth of surface ribs, and without appreciable redesign.

Another weight saving factor is the multitude of die construction for integral fuel tanks. As an example of jet ducting use of integral construction, Keith-Lucas reports that Lockheed has produced over 200 large wing joints, 4x10 ft, for the Super Constellation.

With Special-H in liquid, he says that this technique will soon spread to other parts of the aircraft structure, including wing ribs, spar webs, fuelage



Powder Metal Press

New press is specifically designed for compacting powdered metals, rubs in three and in the reaction industry. It can also be used for compacting ceramic parts and grinding wheels. One feature of the design is an arrangement allowing quick, accurate adjustment for changes of material density while the press is in operation. The press operates with ram in 24 strokes per minute, with round die outside diameter of 10 in. possible, or with rectangular and oval diameters of 10 in. Rated pressure is 180 tons, but can be being pushed for pressure value of about half that amount. Made by Tollymore Inc. of Baldwin-Lima-Hamilton, the machine was first shown at the recent National Metals Exposition, Cleveland.

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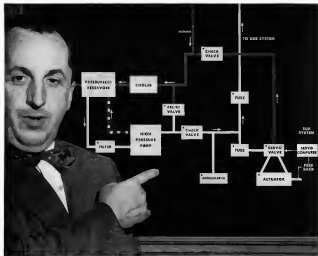
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"Parker has centralized all engine-accessory engineering and manufacturing into a single

operating division. Here you'll find engineers working to design accessories that offer not only extra performance benefits but also cost savings. Because quality depends largely upon precision manufacturing, you'll also find we use the most advanced manufacturing techniques which require many special-purpose machines. Each product must pass rigid inspections and tests that we set up to make sure the customer gets what he orders."

"Having a specialized group of customers, we are able to give these facilities to a faster, more streamlined way of doing business."

"Whether you are interested in one many engine accessories for hydraulic systems, or for fuel or oil-air systems, why not call us in? We want the opportunity to discuss your requirements and to explain what we have in the way of abilities and facilities to serve you."

Engine Accessories Division
The Parker Appliance Company
17525 Euclid Avenue, Cleveland 12, Ohio

Typical hydraulic systems with two sub-systems in which all starred units indicate top-quality accessories offered by Parker's Engine Accessories Division. For example, cone check valves.

One accumulator stores quick response and is thoroughly tested for safe operation. They operate at temperatures up to 250°F. Accumulator rated range from 10 to 400 cubic inches.



Advanced manufacturing techniques save time. This duplicating hole turns close tolerance outside diameters of accumulators in fractional time required by standard lathes.



100% test and inspection of Parker accessories make sure you get what you order. Accumulators are pressure tested up to 4000 psi, hydraulic up to 10,000 psi.



Look at these other products: actuators and master/slave valves represent accessories for engine fuel and oil-air systems. Parker O-rings are approved for all military applications.

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Burns Aero seats are using the lightest steel designed • CMI steel construction, longer maintenance intervals • Corrosion-resistant and finished for greatest comfort • Superior craftsmanship • Built to individual airline specifications • Prompt, dependable delivery • Burns Aero-Tourist seats are in service around the world.

Write for details—Airline or Executive aircraft seats.

BURNS

AERO SEAT CO., INC.

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poorly and possibly even cabin flooring. He sums up the situation in this telling fashion:

In spite of all this there are designers, including many in America, who do not believe in integral construction. They say "Our job is to manufacture aircraft—use chips," or "It is a natural law that hugging out of the solid is a part of a business."

I suggest that most of those who condemn it have not tried it, like those who condemn modern art without having seen any. One American firm which does some "scriptured machining" thus most closely fits the cost of production, including machining, materials and overhead, is \$1.67 per lb. against 56 or 57 per lb. by previous licensing methods. These figures are striking wherever the factor of automation which we may choose to apply.

Extruding, forging, rolling or even casting must be explored to see if there is not a still cheaper way to attain integral construction.

The most serious objection to machining from the solid material is, according to Keith Lucas, that it is going to be difficult to use the highest grade materials without encountering cracking or distortion. He also feels that it is doubtful whether the best properties can be obtained from material in slab form.

The logical development in integral construction is seen in deleting the ribs and substituting multiple webs running upstream along the wing. This will pose a tough problem for the production engineer, since the accessibility for assembly will be extremely restricted.

•Metal Bonding—During adhesive bonding, Keith Lucas points out that some designers are turning to Redux bonding in preference to resins for attaching shingles (Aircraft World Apr. 6, 1953, p. 45).

The most important advantage, he points out, probably is that the method gives better fatigue strength, but better surface finish also is obtained. A continuous interface between the web and stringer is afforded, preventing interest buckling and giving greater compressive strength.

While closed section stringers, such as the Warren or T-sections, are more stable than open sections, such as the familiar Z-section, there has been a reluctance to use them because of the danger of undetected corrosion occurring inside the stringer and laminate skins (riveting is involved). With Redux bonding, Keith Lucas says, the closed sections become much more attractive, they are used extensively on the Constellation.

Extruded rather than formed stringers also are gaining favor mainly because of the good longitudinal properties (Continued on p. 51)



AMERICAN LATEX NEW'S TABOON

Pours like water, foams into super strong reinforcing for rocket doors (See next page)

F94C Rocket Door operation improved with Light, Inexpensive Stafoam



F94C Rocket door doors are subjected to considerable heat and pressure during rocket being. Stafoam blast door system prevents warpage and malfunctioning.

New miracle plastic adds necessary strength and insulation to prevent warpage caused by heat blast

The new revolutionary structural plastic, Stafoam Number 2010, takes countless hours of labor out of the manufacture of the F94C rocket exit doors. It is simply poured into the small cavity in the doors and in minutes it becomes a beam into plastic, completely filling the cavity. After a short period of curing, Stafoam Formulation number 2010 becomes a rigid thermal barrier to the extreme heat of the rocket fire. Prior to its use, high temperatures caused warpage and lack of sufficient rigidity in built-up metal exit doors from closing. Without the necessity of re-designing and re-tooling, Stafoam completely overcame these problems. Light weight cellular plastic Stafoam adds strength by bonding all surrounding members into a super strong unit to allow for supporting extra rigidity. Unlike many foam products as cell structure is of a non-coexisting type, making it moisture resistant.

"Stafoam to revolutionize structural, insulation and safety fields"

"It is truly a miracle material." These were the words of C. M. Christ, President of American Latex Products Corp., at a recent trade press conference. After four decades of operational work with Lockheed Aircraft Corporation, American Latex Products Corp. chemists have now established such a varied applications of Stafoam that it will revolutionize methods and procedures in many fields. Among the most important Stafoam uses are in the structural field because of its low thermal



C. M. Christ

conductivity, rate and moisture resistant, in the structural field because of its great strength and excellent light weight, and in the repair and insulation field because of its slow flex recovery. Insulation is being poured in place to repair leaks through small holes makes it ideally suited for insulating, and cushioning of metal electronic devices as well as large structural members.

Stafoam is self bonding to most materials

Stafoam immediately bonds itself to most surfaces, making it very suitable for insulation in the F94C doors. Through perfect bonding the equal distribution of loads adds tremendous strength to any construction using Stafoam.

Stafoam easy to mix and apply to F94C doors

One of the most important advantages of using Stafoam in the F94C doors is the ease of handling required to apply it. No complicated equipment is necessary. Furthermore, because American Latex Products Corp. has removed most of the non-soluble from formulation 2010, mixing the two components is reduced to merely pouring the contents of one container into the other. No measuring is required. The combined substance is mixed until it attains a slightly drink consistency. Then it is ready to pour. There is never any variation when properly mixed. Non-skilled personnel can be used for the application most successfully.



Filling F94C Rocket door of American Latex Plant with foam in place. Stafoam is ready and quickly performed with a hand-type mixing applicator. Doors are held rigidly in place during curing by simple jigs.

NOTICE!

Although the information contained in this advertisement covers only one application, Stafoam is supplied in hundreds of densities, textures, hard and soft with applications for almost every industry. Some formulations allow self curing others provide for heat resistance in excess of 2000°. For more general information on this truly miracle foam plastic, write for our Stafoam brochure at the following address:

American Latex Products Corp.
PLASTIC DIVISION

3341 West 81 Seguin Boulevard
Hawthorne, California

Lockheed tests show Stafoam has most favorable strength to weight ratio



Two ounces of low density Stafoam supports approximately 60 cubic inches and will resist load up to 180-250.

Because of Stafoam's superior strength to weight ratio, Lockheed found it ideally suited to aircraft manufacture. It is conceivable that some Stafoam may completely replace metal ribs and stringers currently used in wing structures. By applying Stafoam to a shell of aluminum strength for weight can be realized and many costs, most hours of assembly time can be eliminated. Assemblies from two pounds up have successfully been performed and can be virtually controlled.

Stafoam, a registered trademark of American Latex Products Corp., is manufactured under "LATACRAM" patents owned by Lockheed Aircraft Corp., Burbank, Calif. "Registered Trademark of Lockheed Aircraft Corporation."

American Latex Products CORPORATION

3341 West 81 Seguin Boulevard • Hawthorne, California

HOW TO TEACH A MISSILE to read a map



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was asked to find
the answer

And, And of goes a missile. But where? And how to stay on the right track? And how to find the target? That's the problem Ford Instrument is helping to solve.

This is typical of the problems that Ford has been given by the United States since 1945. Far from the vast engineering and production facilities of the Ford Instrument Company come the mechanical, hydraulic, electronic, thermal, magnetic and electronic instruments that keep our tomorrow's today. Control problems of both industry and the Military are Ford specialties.

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they involved and also because the corner filter helps to speed suitability.

The extended V-shaped probably is the most efficient form known. Krith Loren says, but a single angle can be tapered by machining, it is duplicating one of the advantages of integral construction.

► Sometimes carrying metal bonding is saving up a wide field of possible sandwork construction. In one aluminum heat-treated case applying thin plates or holes substitutes as a filter material.

Heat-treated is now used in a double-duty sandwork to replace the conventional dust-and-strainer combination as, in very thin components, is a complete filter between the outside dust. In the latter case it also replaces the side (T) wing and stabilizer of the Glue L. Martin B-60 Mustang piston bomber with aluminum heat-treated. It begins to look as if we are running the end of what we can expect from this source." Krith Loren says.

Much of today's high-speed aircraft structure is designed on considerations of stiffness, then strength, and, in such case there is no point in using the very high-strength materials, the Krith design change.

This is only a confession of weakness," he says, "because it means that we are not getting the best out of our materials. The logical solution is to show reduced stiffness by making the aerodynamic definition work for us in-

crease the sandwork so that it is costly in space, particularly in the light of integral fuel tanks. But this objective should not detract against the use of the material for control surfaces or boundary cases, for example, where internal space is hardly useful.

Another limitation is that as very thin wings it is inefficient because it brings the material too near to the wing control case. On thin wings of this type, the end loading is likely to be high, so that sandwork construction is unreliable in any case, Krith Loren continues.

However, he goes on that the sand work will be used extensively in the future and not only the secondary structures or in light control.

Materials

Strength properties of aluminum alloys have improved steadily. Although a great help to the structural designer, it begins to look as if we are running the end of what we can expect from this source." Krith Loren says.

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Auxiliary Jet Pod Details

The auxiliary jet pod developed for the B-60 Mustang by consultant Krith Scholte is one with all of its working as usual. The engine is a Turbomeca Murex jet pump 5915B thrust. Cauda support over the three-fold purpose of all

kind of motor and motor. It all plans to run both of the Murex as an auxiliary pump and as a C-40 Compressor (Aviation Week Aug. 18, p. 30). One of the complete podwork is estimated at \$25,000 ready to install.

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For all welding in chrome and nickel steels and their various alloys. The surface during welding. You can clean up the surface and bond between tubes and metal. To be used with solder and in welding wire. To be used with solder and in welding wire.

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Electric FLUX
Made specially for welding electrical parts and electronic equipment. Free of salts, acids and alkalis. No fumes and no smoke. Can be used for continuous tinning of copper wire. Available in stick or heavy liquid form. Electric Flux. This is the key to a strong joint. This is the key to a strong joint.

Aluminum FLUX
Non-oxidizing, non-toxic. Can be used with pure aluminum or alloys. Aluminum coatings in the metal alloy during. Free from fumes and smoke. Can be used with 30/30, 40/60 or 70/30 solder. Non-oxidizing properties that ensure better flow. This is the key to a strong joint. This is the key to a strong joint.

Concentrated or Free Problems Involved
If you have a problem with your soldering, you can solve it with Laco. Laco is the key to a strong joint. This is the key to a strong joint.

LAKE CHEMICAL CO.
2654 W. Carroll Ave.
Chicago 12, Illinois

stead of upset, and to overcome flatter by stability instead of vulnerability. This is the philosophy behind the aerospace wing which deserves a lot more attention than it has at present.

The Short Skape, Keith Lucas points out, is the first aircraft to be fitted with an aerospace wing. (For a discussion of this subject, see *Aerospace Week*, Nov. 17, 1962, p. 22).

Other limitations to the use of high strength aluminum alloys are poor corrosion properties and low elongation, he says, adding that these are also aspects that they are not too good in fatigue. Much more must be learned about fatigue, but it is already known that with high grade materials more stress allows not more than a given surface finish of mechanical parts, and sometimes is essential particularly on wing shearing.

Look at Transonic-Like, which is a transition circle, Keith Lucas believes that laminar and its alloys hold great promise for the future—when they are better understood and when the gaps in knowledge are made considerable. The gaps are that only a few years ago one was almost the effects of low temperatures on jet aircraft causing in the atmosphere. There was a deep concern about the needs of certain metals at —70 or —300° C. One was also concerned about transparent systems which become brittle and control easily.

Now, he says, we are equally worried by the high temperatures presented by supersonic flight. This is where the main alloy is greatest promise.

People's concern in the future, Keith Lucas says, "To be made the effort to understand it properly. It

properties are not yet sufficiently understood for us to put all our bets on it."

Just Klausman-Wing, coming through the development of joints is shown by Keith Lucas. He points out that the use of large forgings, integral construction and plastic weldings are a beginning, but the idea must be continued.

Of all the responsible trends in design, he says, the one towards force joints, hence towards larger joints, is one of the most clearly defined.

► **Too Much Complication?**—Keith Lucas contends it can't just be said that complication is unnecessary. His philosophy is that a designer's business is to design the right aircraft for the job. If added complication allows one to do a job that cannot be done without that complication—then it is worth it, he says.

However, too much complication is a fighter makes it too large and heavy impacts performance. Increasing complexity by this condition tend to decrease the number of aircraft produced.

Keith Lucas sees just the place of complication in making "What you see is the use of the perfect amount of it, but, so long as there is no need to look the vital one in the right place to meet the emergency when it attacks."

Emphasizing the forward, research in planning new ideas, he concludes that the production man and the designer must close their ideas together, neither leaving the other behind, for the simple reason that neither is so good without the other.

—Living Stone



Thunderstroke Production in High Gear

For the reason that Republic Aviation Corp. is now producing F-4H Thunderstroke light bomber (also design 105-105) in one section of the Thunderstroke.

In Y. plant work plans being completed in considerable quantity in final assembly (background). The tightly grouped work lines indicate large Air Force orders.

"HAMMER-BLOW"

Vibration-Proof SWITCH

Gives Exact Switching Control Regardless of Shock or Vibration



Type 5000


Adjustable

Now, no more premature switching at trip points due to shock or vibration. This new Electro-Snap miniature switch operates only when you want it to—and at exactly the same trip point every time!

A special snap action mechanism maintains positive pressure (45 grams) on contacts until trip point. Switch can't be "ticked." When actuated, the mechanism shifts the movable contact to these new points on with "hammer-blow" force. An exceptionally high holding pressure (150-200 grams or twice that of standard switches) after actuation prevents trip point "batter" and contact "bounce" reduces arcing for longer life. Switch is rated at 10 amps, 125-250 v. AC or 50 v. DC.


Since the snap action is independent of the speed of actuation, you can get exact control even with slow moving cams. A small movement differential gives you the precision you need for timing movements of presses, grinders and milling feeds, and many other machine uses. When vibration is your problem, the Electro-Snap "Hammer-Blow" switch is your solution.

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Provided with glass fiber glass skins, Hexcel Honeycombs also give ultra high strength with minimum weight, maximum rigidity and moisture resistance.

The belly radome is probably the largest reinforced plastic structure ever built—the upper radome is 7' tall. Both radomes are fabricated by Lockheed Aircraft Corporation for Boeing Phantom Company.

Combined with the Super Cassid's rugged aluminum honeycombs, these unique radomes give 360-degree radar coverage, bearing search rays far beyond the sea level horizon.

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HEXCEL HONEYCOMB CO., INC. IS A DIVISION OF GUSTON HONEYCOMB CO., INC. 100 Sycamore Road, Oakland 8, California. REINFORCED PLASTICS DIVISION

PRODUCTION BRIEFING

►Hydra-Air, Inc., Burbank, Calif., has purchased an additional 10 acres in the vicinity of its main plant to expand turbo-propulsion research and development, and for production of aircraft fuel booster pumps.

►Lam Laminates, Inc., Huntington Station, N. Y., and Ashland, Ohio, has obtained the exclusive services of Gannett Aircraft Engineering, New York, N. Y., for design, engineering and consultation in reinforced plastics.

►H. K. Porter Co., Inc., Pittsburgh, Pa., has acquired Alloy Metal Ware Co., Prospect Park, Pa., and will operate it as a division of the parent firm. Alloy Metal Ware produces stainless steel and alloy steel ware, roll and drag.

►Helipac Corp., South Pasadena, Calif., produces polystyrene units, has opened an entire plant in Monrovia, Calif., with 14,000 sq ft of manufacturing area. An additional 6,000 sq ft in the new plant will be used for eastern regional offices and showrooms.

►Bendite Corp., Niagara Falls, N. Y., has joined with three other firms to expand research and development of various metal borides for military and civil applications. Borides, carbides and nitrides show promise of handling 1,000-2,000° temperatures in turbojet, rocket nozzles and other applications. The firms that will cooperate with Bendite are Firth Sterling, Inc., Pittsburgh, Pa., American Electro Metal Corp., Yonkers, N. Y., and Carlo American Co., Niagara Falls, N. Y.

►Flexservice, Inc., San Francisco Valley, August, Van Ness, Calif., has been organized by Bill Shuler and Bud Robinson to handle aircraft maintenance and repair, specializing in "business planes." The firm has acquired the assets of R&S Aircraft Service, Inc., and equipment and facilities of Neo Air.

►Flex-O Tube Division of Mordlen Corp., has opened a new assembly plant at 10711 Claudy Blvd., North Hollywood, Calif., to service the West Coast's hose and hose coupling requirements. Flex-O Tube's main plant is in Detroit.

►Westinghouse Electric Corp., Pittsburgh, Pa., is moving engineering and office staff personnel into the firm's 11-million dollar Power Division plant in Newark Township, approximately one mile southeast of the Allentown Valley Forge interchange of the Pennsylvania Turnpike.



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U.S. Firms See Reverse Jet Unit

A French reverse-thrust device which could go into production tomorrow has been chosen by U.S. jetport manufacturers. It was recently demonstrated here by Hispano Deshoulers, president and chief engineer of the French manufacturing engine firm, Société Nationale d'Etude et Construction de Moteurs d'Aviation (SNECMA).

In an exclusive interview with Aviation Week, Deshoulers said that every new turbo-propeller jet engine he designed had proven the worth of the SNECMA reverse-thrust unit. It has been used in place of jet boosters up to a Mach number of 0.9 at various times during a flight test program now nearing the 150th test.

Between 20 and 30% of the static thrust of the engine will be available in reverse thrust by using the SNECMA device, Deshoulers says.

► **Top Purpose**—Deshoulers visited the United States to exchange subject data with American firms and to discuss their interest in building or developing the SNECMA reverse-thrust device in this country. He sees there was considerable interest on the part of most American manufacturers, and he believes the SNECMA unit is more ad-

vanced than any other he has seen. SNECMA's big Valonia turbojet, now ready in production, completed a qualification test at 11,300 lb on level static thrust last May. Deshoulers says this engine is now ready for production tests at the 17,000 lb mark.

Valonia production is scheduled to begin in 1955 with an 11,300-lb thrust engine. It is a single-compressor axial flow turbojet, basically the same as the bigger flame, SNECMA's Alcyon series.

► **Current Production**—Most of the firm's facilities are devoted to turning out the Alcyon 1030 and 1040 with the R series coming into production.

Current thrust rating of the 1010 is 6,600 lb. from an engine weighing approximately 1,500 lb. With an afterburner, the D will give 8,400 lb. thrust, the designation for the combination of the D engine and afterburner is 1010R.

Still another engine in the series—the 1040—is rated at 7,770 lb. thrust without afterburner. Using the same afterburner that SNECMA developed for the D engines the R turbojet added its thrust to about 5,400 lb. on the test stand.

The reverse in thrust has been achieved without any weight increase, in fact according to Deshoulers, there was no appreciable weight decrease. Deshoulers for the 301E engine with afterburner is 301E.

Temco Buys Rights To Twin Navion

Temco Aircraft Corp., Dallas, has purchased exclusive engineering and conversion rights for modifying Ryan Navions to twin engine configurations from the original owner, Doris Ryan Aircraft Corp., Los Angeles. Kelly Aircraft Corp., Dallas, continues to handle Twin Navion sales and distribution under a contract with Temco.

Temco has been converting Navions to twin engine, four-place, business planes since April 1951 under a \$1.9 million contract (it had signed with Kelly. At least 100 conversions by May 1954 are covered under this contract.)

The company recently completed two modifications including the 17000 allowable gross weight by 400 lb. to a maximum of 13,450 lb. (Aviation Week Jan. 4, p. 126).

APD Office Expands

Cleveland Air Proving Ground District has been expanded to include the southwest corner of Ohio, formerly served by the Detroit district, and parts of central Ohio and West Virginia, formerly under the Dayton office. The new boundaries provide those of other state and federal agencies



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Martin offers modern engineering facilities and liberal benefits, including company paid vacation plus liberal medical and many other advantages. Housing readily available. WRITE NOW TO: J. J. Hays, Production Engineering Dept., A-6, The Glenn L. Martin Co., Baltimore 3, Md. Include confidential resume with full details of education and experience.



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ENGINE-DRIVEN G-E ENERGIZER, 35-hp, 500/1000-cw, installed on 4-wheel trailer accommodates a completely self-contained power plant and weather-proof housing. Shown here starting on P-54 jet.

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FOR COMPLETE INFORMATION, contact your nearest G-E Appliances Sales Office or write for Bulletin GEA 5565, 5565, 5565, 5565, General Electric Co., Section 755-3, Schenectady 5, N. Y.

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USAF Contracts

Following is a list of recent USAF contracts awarded by Air Materiel Command.

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Avco Corp., 215 W. Chestnut St., Philadelphia 10, awarded authority of contract \$100,000.

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NAA Earnings Hit Postwar Peak

Net income of nearly \$13 million after taxes, and sales of more than \$636 million came close to wartime highs.

North American Aviation, Inc., the first major aircraft producer to report its 1953 results, posted its second postwar sales of \$636.5 million in its fiscal year, ended Sept. 30. This sales total doubles the \$317.2 million sales of the previous fiscal year, but falls short of NAA's all-time record of \$858 million in 1944.

These results are significant, not only in this postwar to North American, but in a possible reflection of other aircraft companies reports that are yet to come.

► **Net Income Up—Net income**, after taxes, for 1953 grew to \$12.5 million, or \$1.72 per share on 5,435,031 shares outstanding. This compared with \$7.3 million, or \$1.33 per share, for 1952. Earnings for 1953 were exceeded only in 1944, when they amounted to \$14.2 million.

Although sales increased more than 100%, net income after taxes grew only 64%. This results the continuing contraction in profit margins before and after taxes.

For 1953, profit margin on sales before taxes was 6.7% as against 6.4% the year before and 9.4% in fiscal 1949. Profit margin after taxes in 1953 was at its all-time low, 1%.

► **Dividends Rise—North American**, the first major aircraft producer to report its 1953 results, posted its second postwar sales of \$636.5 million in its fiscal year, ended Sept. 30. This sales total doubles the \$317.2 million sales of the previous fiscal year, but falls short of NAA's all-time record of \$858 million in 1944.

► **Not Worth at Peak—The intention** of about half of the company's earnings has permitted a satisfactory bolstering of the net worth or equity position. At Sept. 30, 1953, North American's net worth reached an all-time peak of \$67 million, or \$25.94 per share. Significantly, this compares with its equity at period at only \$56 million, or \$1.76 per share, at the 1947 record.

Great capital expenditures during the 1953 fiscal year amounted to more than \$19 million, compared with the \$7.4 million expended for this purpose during 1952. Construction of its own facilities has figured prominently in North American's program of maintaining a leading position in the aircraft industry. This phase receives special mention in the company's annual report.

Reference is made to the consolidated construction of a new regional headquarters and facilities in other development facilities.

► **1994 Outlook—The company's** estimated backlog at Sept. 30, 1953, was \$1,197 million, including \$212 million of business in negotiation. Commercial backlog figures at Sept. 30, 1952, stood at \$5,121 million.

Despite this small relative decrease, certified orders more than substantiate management's assertion that "present schedules for the 1954 fiscal year call for continued production at relatively high rates, and it is expected these low rates will be substantial."

► **Unseasoned Loans—The increase** in activity has necessitated heavy working capital requirements. Total investments at Sept. 30 aggregated \$314.6 million against which progress payments of \$274.8 million were received from the government. This left \$39.8 million of investments to be financed by the company itself. For this purpose management utilized short-term borrowings which were outstanding in the amount of \$40.5 million at the 1953 fiscal year-end.

A reflection of North American's credit position is indicated by the conversion of the company's debt. Not working capital (after full allowance for bank borrowings) amounted to \$48.4 million at Sept. 30, 1953, up from the \$46.4 million a year earlier.

► **Stockholders' Representative Letter** to the annual report comments on the strike of its employees which "effectively" ended Dec. 22, 1953. Among other things, it is noted that the settlement agreement signed by the union representative was the same wage increase proposed by the company before the strike. Management estimates that during the 56-day period of the strike, employees lost more than \$16 million in wages.

As for operations, management notes

that, "While the long queues of the current fiscal year will be affected, it is not anticipated that the strike will seriously reduce the company's sales and earnings for the entire 1954 fiscal year."

► **Positive Research and Development—While the financial figures speak for themselves in revealing the outstanding accomplishments of North American, the annual report devotes considerable space to the technical development it has undertaken in the aeronautical sciences.**

This work has made it possible for the company to become a major factor in airplane, missile and control equip-

ment, and atomic power development. Particularly revealing is the amount of research and development necessary to come forward with a winning production item. A period from time to time between the initial design conception of a new type is frequently required before full production of that type can be anticipated.

General financial elements on the order for quick profits in the current industry would do well to heed the North American management conclusion that

today's technical success or failure cannot be read as sales charts will move years in the future.

—Selig Aitchard

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American Type Foundry, Inc., Elizabeth, N.J., Daystrom Furniture Co., Orem, N.Y., Daystrom Electric Corp., Englewood, N.Y.

AVIONICS

Carriers Test New Transistorized Mike

- Major U. S. airline tries Remler unit for more than 1,000 hours, is considering it for fleetwide use.
- 'Transductance' telephone-style handset is expected to offer strong competition to conventional carbon type.

By Philip Klein

The widely used, but short-lived, carbon microphone may have serious competition for airline public address and radio communication use from a new variable-inductance mike with a tiny built-in transistor pre-amplifier. The new device, developed by Remler Co., Ltd., of New Providence, will make the last airline use of transistors, two common tube replacements.

► **Improved Fidelity**—The Remler mike offers improved fidelity and lower static, attractive advantages in airline PA systems and air-ground communications.

One major U. S. airline has tested the new microphone for more than 1,000 hours in actual service and is reportedly considering a fleetwide purchase for PA use (AVIONICS WEEK Jan. 4, p. 11). Another major airline has reported Remler mikes for air-ground radio use as its first choice. Several commercial aircraft manufacturers also are reported interested.

The Remler "Transductance" telephone-type handset, containing a variable inductance element and a two-stage transistor pre-amp, is described as comparable with presently used static carbon mike handsets, without requiring changes or other modifications. The "Transductance" handset output signal is higher than that of a conventional T17 carbon mike, through a wider frequency range, Remler says.

► **More Collected**—The carbon microphone, sometimes dubbed "the world's most expensive loss conversion," came under fire when international airline experts gathered in Copenhagen in 1957 for an International Air Transport Association symposium. Representative complaints at the carbon mike included:

- **Distortion**—"Our experience has been that distortion is the difficulty in obtaining good intelligibility.... After the carbon microphone has been in service for a week or so, you can't shake it.... and your output changes by at least 6 db."—B. F. McLeod, Pan American World Services.
- **Distortion**—"Static buildup (carbon) mike produces sufficient distortion in

still to create misinterpretation before you can get into flight.... and (speech) clips, making them ineffective."

► **U. A. First**, Trans Canada Air Lines. • **Landed lower**—"Our company has participated in a vast amount of work on microphones for aircraft and I think we can dismiss the carbon microphone completely from having any pre-eminence anywhere greater than it has."—J. D. Woodward, Radio Corp. of America.

Despite these disadvantages, the carbon mike has enjoyed almost universal sales use in this country until recently because of its comparative simplicity and its high level output signal.

The low signal level of the dynamic mike requires a pre-amplifier. If sensitive tubes are used, the pre-amp is so large that it must be located in the main PA amplifier or pickup, with the rest of the pickup circuit in the cable between the microphone and the pre-amp.

However, Lockheed is recommending conventional microphones for the PA system in its Super Constellation, and presently all operators, including Eastern Air Lines and Trans World Airlines, are using those or plus to American Airlines plans to convert its DC-7s to use dynamic mikes in their PA.

► **Translates the Answer**—The advent of tiny transistors has made it practical to build a combination mike and pre-amp into a package no larger than the carbon mike element. Transistors operate from low voltage, need no heater power, making it possible to operate the pre-amp from the same source normally used with the carbon mike.

Remler quotes the following characteristics for its new Transductance mike: • **Frequency response**—+6 db between 500 and 6,000 cps, with 6 db feedback slope below 500 cps. • **Output**—0.775 v. rms. at 100 ohms/imp. or at nominal 27.5 supply voltage. Output is down only 2 db at 100 ohm voltage drops to 15 ohm.

► **Reliability**—Blindfolded or only transistors needed by mistake, Remler is positively sure (Keithley CK72) positive transistors which are individ-



HIGH FIDELITY MIKE, using dynamic microphone element and transistor pre-amp, can suppress self-noise of microphone and reduce public address system.



TINY TRANSISTOR PRE-AMP and variable inductance mike are housed in container no larger than the carbon microphone element of the new Remler Co. test system.



FREQUENCY RESPONSE of new mikes compared with the T17 carbon mike.

ually tested on a glass photo eye. For added protection against leakage, Remler encases the entire pre-amp with a plastic seal. Since better or lower-cost transistor types become available in the future, they will be substituted for the CK72, company says.

In addition to airline usage tests, the new mike has been subjected to 16 weeks of continuous life tests, at room temperature, without degradation in performance to date, according to Rem-



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le's A. R. O'Brien. He also reports no ill effects after nine exposures to -66F, 121F, 91,100F, finally at 122F, and 50,000 ft altitude.

The nondestructive ultrasonic direct read is one which Bendix has manufactured in large quantities for Navy and Marine use, according to its spokesman. All parts are designed to withstand typical environments.

Bendix is not taking about the details of its transistor circuitry, for competitive reasons, except to say that it incorporates limited problems. The company is currently producing the same Transistors used in most systems.

Company address is 7301 Revere St., San Francisco 10, Calif.

New Avionic Devices

A variety of new components available for use in avionic equipment have recently been announced. Among these:

- **Highspeed relay, M838-108 series**, operates at less than two milliseconds and employs a damping technique which virtually eliminates mechanical chatter and contact time. New relay operates at -55C, comes in EPDIT style with contact rating of 2 amp, operating coil current at 17 ma, housed in a hermetically sealed, plastic container. Electronic Division, Los Angeles Metal Co., 3838 St. North Ave., Portland 2, Ore.

- **Wide-range RF indicator, Type 6028K1**, can be used to vary oscillator frequency of a variety of precision over the range of 4 to 129 mc. Trade name: the Indicator, device has size needed

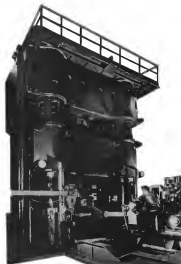


winding which varies inductance of line output windings covering the required frequency band. CUS Laboratories, 391 Leffler St., Southfield, Mich.

- **Circuit power envelope**, whose windings are completely enclosed as necessary, is said by General Electric to be up to 30% lighter than conventional construction and the first to meet high temperature derating "V" of MIL-

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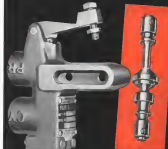
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R-28H. New model will be available in MIL type RW2035, from components dept., Electronics Division, General Electric, Syracuse, N. Y.

• **Crystal.** C-5 series, available with focus window of 4 to 50 hr., for providing precise frequency control at temperatures of -40 to 70°C. Crystals are hermetically sealed in plug-in base glass enclosures. Janss Knight Co., Sandwick, Ill.

• **Four-delay relay.** Type SF, has pneumatically controlled time delay, externally adjustable over range of 50 milli-seconds to more than one minute. Delay operates from 24 v.d.c., means in double throw, single, double, or three pole styles, is hermetically sealed case measuring 2 1/2 in. square, 4 in. high. Weight is 1 1/2 lb. AGA Division, Elanco Drug Nat. Corp. of America, Elkhart, Ind.

• **High temp. linear pot.** Model LC2, capable of operating at temperatures of -110° to 680°F, rated 5 watts, is available with linear slide travel of 4 to 16 in., and capacities up to 450,000 ohms/ohm. Standard linearity is 0.5%, but can be obtained with 0.1% linearity. Gelmatics Inc., 2607 E. Fort 3rd Blvd., Pasadena 3, Calif.



Small Computers Fit on Desk Top

Desktop model computer, measuring only 20x21x10 in., is capable of solving such order differential equations, Reeves Inverness Corp. announces.

The new small Rees is available in two models: C301, requiring external problem control, and the C302 with built-in problem control. Both have built-in power supplies for amplifier and relay operation and an internal computing reference source. Problems are set up on prewired patch boards.

Both models have 12 automatically shapable variable computing amplifiers, identical to those used in latest Bellcore Rees, with a drift of less than 0.25 mv/day and 4 e. gain of more than 15 million, Reeves says. Operations are performed with accuracy better than 0.1%, according to company. Reeves Inverness Corp., Dept. 4, 215 E. 91 St., New York 28, N. Y.

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*Fabricated here in a thinwall stainless steel tube bundle heat exchanger

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Spot Remover



HEAVY RAINSTORM usually produces the kind of distress in a previous approach after scope because soda crystals are reflected by raindrops. In photo shown, the distress completely obscures a T-15 jet engine only 15 miles away.



CLUTTER IS ELIMINATED here, showing T-15 jet engine (shown) by giving soda crystals similar polarization. Results in that circular polished area when from side scope are unable to enter the solar screen.



CIRCULAR POLARIZATION is based on the sun's action of the GORDON Box CPN 4 approach color by means of a small grid which operator can lower in front of window lens from during a heavy rain. Grid converts circular horizontal polarization to circular polarization.

New Microwave Test Equipment

Several types of microwave test equipment for laboratory and/or field use recently have been announced. The list includes:
• VSWR meter Model 110A, X-band

AVIATION WEEK, January 25, 1964

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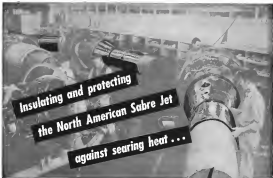
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voltage standing wave ratio indicator, covering frequency range of 8.8 to 9.6 kmc, includes oscillator, and a wave meter for accurate frequency settings. Wave meter is repeatedly accurate to within 1 mc, and overall instrument accuracy is 2.5%. VSWR range of 1.90 to 2.5 is covered in two scales. Manufacturer is Color Television Inc., 5035 E. San Carlos Ave., San Carlos, Calif. • Signal and sweep generator, Model MS-6 signal generator, covering the frequency range of 3 kmc to 18.75 kmc, and another model covering 15.75 to 16.25 kmc, are now available from Polaroid Electronics Corp. Both units have provisions for internal pulse or FM modulation as well as for external modulation. Company has also announced an X-band sweep generator, which varies RF energy continuously between 8.5 and 9.6 kmc at a rate of 12 cps. Dual-beam display unit allows both selected and transmitted energy to be viewed simultaneously. Company address is 100 Metropolitan Ave., Franklin 11, N. Y. • Wavemeter, Model WMS-6A, compact bench-type unit indicates wave-

IRE Avionics Days

Aviation Electronics Days, consisting of three full technical sessions and a special luncheon, have been scheduled for May 22-23 during the scheduled convocation of the Institute of Radio Engineers in New York to commemorate the 50th anniversary of powered flight. Plans for the event, in which the Institute of the Aeronautical Sciences will participate, were announced by Dr. K. C. Black, chairman of the professional group in Aeronautical and Navigation Electronics (formerly Avionics Electronics). Fifteen technical papers, most of them on avionics subjects, are scheduled for presentation, beginning Monday afternoon, May 22. Both Tuesday sessions and the luncheon will be held at the Hotel Statler, 496 St. and Lexington Ave.



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Requirements: Minimum of two years experience, and a BS degree in Electrical Engineering.

SYSTEMS ANALYSIS ENGINEER

Duties: Automatic aircraft and missile control systems analysis. Determination of aircraft systems configurations and equipment characteristics. Analysis/development of autopilot, radar, fire control and target systems.

Requirements: BS or MS degree in Electrical Engineering, Mechanical Engineering, or Physics, and experience in the same or allied fields.

HYDRAULICS ENGINEER

Duties: Analysis and design of hydraulic valves, systems, actuators and servomechanisms as applied to aircraft and missile guidance and control.

Requirements: Three or more years experience in allied field and a BS or MS degree in Engineering.

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JANUARY

length directly in connection to a digital counter. Instrument range is 600 cm. Thompson Products, Inc., Elm Street Dr., 2156 Cleveland Road, Cleveland 3, Ohio.

FILTER CENTER

Senior-Rubber Stone Timmer-Philo has repeatedly discovered a new true solution capable of picking where, thereby opening the way to the same future of high-temperature rubber tires. He is now developing "rubber burner" technique (AVIATION WEEK Jan. 4, p. 38). Two loads, one for picking and the other for disintegrating (rubber) materials, are required. With compression, a single solution can be used for both jobs at the present.

IREE Film Management Center-IREE's professional group on engineering management has scheduled a second series of 15 weekly group discussions on the subject of "Engineering Management in the Electronic Industry," to begin in March in Los Angeles. First management course, now underway, was oversubscribed, has separate office of 17 electronic companies in the area.

RADC Trans DME Modification-USAF's Rome Air Development Center is trying its hand at modifying a Civil Aeronautics Administration (CAA) ground system to determine problems involved in converting present civil DME to new military system. (Aviation Week, Dec. 7, p. 40).

A. V. Roc Adds Computer-A. V. Roc Controls Ltd., Toronto, which makes the CR-6000 fighter and Orville, has expanded its computing facilities with addition of two U & S-built machines, at cost of \$100,000. One is a Cyber 122A digital computer, built by Computer Research Corp.; the other is a Boeing Aerospace Co. analog computer.

Devco to Probe Terrestrial Field-Minneapolis (Devco) has developed a 64-bit device to enable Air Research & Development Command's Cambridge Research Center to measure terrestrial electrical field between earth and ionosphere, which begins between 60-80 miles above the earth. Objective is to get data which may explain recent of 1,500-volt current which is constantly flowing toward the earth. M.H. semi-electronic, which accounts electric currents as low as 10^{-12} of a microampere, will be used with a hollow to report on electrical conductivity, air temperature and pressure.

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WHAT'S NEW

New Publications

A Spanish edition of a lesson of aviation terms published by International Civil Aviation Organization has been issued. The Spanish version, titled "Léxico de términos usados en aviación civil internacional," contains some 3,000 terms commonly used in Spanish, with English and French equivalents. Price for the volume is \$1.75. Orders may be placed with ICAO at Montreal, Her Majesty's Stationary Office, London, or ICAO regional offices in Lima, Cuzco, Melbourne and Paris. Payment should be in the currency of the country where the order agent is located.

Aircraft Design Through Service Experience, CAA Technical Manual No. 145, presents master design practices which have resulted in accidents, malfunctions, defects and incidents. In each case the corrective action taken is given. Write Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price \$1.25.

Pilot's Radio Handbook, CAA Technical Manual No. 152, is a 132-page publication explaining in non-technical language operational use of aeronautical radio. It includes information on emergency, flight assistance service, low and medium frequency ranges, coastal power broadcasts, radio weather and en route radioteletype procedures. Write Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price 45 cents.

Telling the Market

Illustrated 4-page folder issued by Weston Instruments, Inc., 410 Fairfield Ave., Stamford, Conn., presents specifications tabulation of company's electronic test instruments, including such topics as application, range of functions, accuracy, and physical and electrical characteristics. . . . Folder, issued by DeWitt Engineering Co., 136 Lafayette St., New York 15, N. Y., gives complete specifications on a line of lathe clocks, including moderately slow-speed universal, low-speed independent, heavy-duty turret lathe, heavy-duty Turret concentric and body, medium-duty four-gear universal and universal back plate clocks, all metric inputs. . . . Weston Manufacturing Corp., Portland, Me., is offering a new bulletin covering the line of industrial hydraulic relief valves, describing in detail the pilot-operated valves available in four sizes from 1/2 in. to 1 in.



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Board Approves NAL Copter Experiment

- National wins permission to operate nonsubsidized scheduled service, despite protests from other lines.
- Carrier will begin flying Sikorsky S-55s next week, limited to a year of tests within 150 mi. of Miami.

By Frank Shaw, Jr.

Civil Aeronautics Board has given temporary approval for National Air Lines to operate passenger helicopter services starting Feb. 1 within a 150-mile radius of Miami, pending the way for establishment of the carrier as the first non-subsidized scheduled copter operator in the U. S. (AVIATION WEEK Nov. 10, p. 25).

For the past several months, National has been using one Sikorsky S-55 in the area on a charter basis. Two additional S-55s, presently on order, will be added (AVIATION WEEK Oct. 12, p. 21). Part is scheduled for delivery within two weeks, and the other should be ready in March.

• **Cautious**—In granting approval, CAB set down three conditions.

• **Passengers** permitted for one year.

• **No support**, judgment as to landing area shall be issued within a 25-mile radius of point certified to another carrier or carrier not yet certified to National.

• **No part** of the operations shall be undertaken with mail pay.

CAB's action comes after opposition from Eastern Air Lines, Southern Air Transport, Inc., Gulf Aircraft Corp. and Southeastern Helicopter Service, Inc., all of whom had filed comments against National's application. They had urged that it be disallowed or denied, or in event that permission was granted, such permission be given to other carriers.

Del., outstated carrier among the opposition is Eastern. Transport, CAB and Southeastern are not certified, although Transport is the holder of a currently effective letter of authorization as a large regular carrier. Each of the three, however, has on file with the Board an application for certificate authorizing helicopter service for passengers, property and mail in the Miami area.

• **Types of Service**—The Board points out that, since the service National permits is experimental, it is responsible to state precisely what form the operations will take. However, according to National's original application, the op-

erations should embrace three types of service:

• **Rescue** two or more of NAL's certified points located within the area.

• **Helicopter** points within the area which National is not authorized by its certificate to visit, but which, if limited to emergency landings and moving in part of a through interstate journey, would not require economic authorization from the Board.

• **Carrying** through passengers between airport serving one of National's certified points, such as Miami, and other communities within the area.

From that, the Board concludes that National could conduct various of the services without additional authorization, emphasizing, however, that additional authority would be necessary to permit operation of more extensive service than the carrier contemplates.

In its ruling, CAB states: "Delays imposed on the Board by the Civil Aeronautics Act require not merely the regulation of civil aviation, but in addition call for the active promotion of an adequate air transportation system."

• **Price Certificates**—Mandate of this latter responsibility, the Board has in the past by both certification and exemption authorized a wide variety of new services on a temporary and experimental basis, the only ones.

"Taking cognizance of the technical advances that have occurred in rotary-wing aircraft and the possibilities of the helicopter, the Board has already issued certificates authorizing three carriers to engage in transportation of persons, property and mail by helicopter on an experimental basis in the New York, Chicago and Los Angeles areas."

"Each of these companies that has been given this authority engages only in these limited helicopter services and the cost to the government in supporting these through would pay his loss and is solely substantial."

Up to now, the Board had not authorized helicopter operations as an experimental certificate carrier as an aid to its regular services.

"As a result, the Board has no information based on experience that

would indicate the cost or the special advantages, if any, of such an operation or that would furnish the Board with a basis for determining its future course with respect to approval for its ability to conduct certified helicopter operations."

• **No Federal Cost-CAR** points out that the National experiment should make available specific cost data, representing that to be obtained from New York, Chicago, Helicopter Air Service, Inc. of Chicago, and Los Angeles Airways—present copter carriers—that will assist in formulating a sound helicopter policy.

Equally important, says CAB, is that the National service will be without cost to the government. "The Board concludes."

"In the absence of strong reasons to the contrary, the Board believes that under the circumstances here it is clearly in the public interest to permit National to conduct experimental helicopter operations in the Miami area on a temporary basis."

Granting that protests filed by opponents of the National proposal must directly the question of possible adverse effects of the service upon other persons, CAB says that since no carrier has been authorized to conduct a local service or helicopter service in the Miami area, the question of competition with such service is not present.

Referring to possible effects on Eastern, the Board concluded that, under conditions specified, approval of National's favor will not have such adverse effects on Eastern as to warrant denial.

With regard to NAL's other three opponents, however, the Board states: "These amounts for consideration a determination of the report that this will have on the three carriers that have applications on file for certificates authorizing them to conduct helicopter operations in the Miami area."

"Clearly, a grant of National's request does not constitute any determination of the merits of those applications and will not be considered by the Board in granting National any permissive rights to any certified helicopter service that may ultimately be authorized on that area."

"On the other hand, it would be unrealistic to fail to recognize that as a prelude to the granting of National's application, will place the applicants for certificates in a less advantageous position. . . . However, an



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Indiana, it is my opinion that the benefits that will flow from the National experiment outweigh any adverse effects a single hour of extra congestion demands of existing certainties."

As NAL official told Aviation Week the story is "extremely optimistic" concerning success of the experiment in the lucrative Miami market, they didn't schedule would be established as

soon as possible after a series of trial runs throughout the area. Rule books will be filed with CAB as soon as set.

The airline has similar plans for Tampa, Fla., and Norfolk, Va. Long range plans call for eventual replacement of the seven passenger S 516 with either the 40-passenger Fokker VH-16 or the 50-passenger Sikorsky S-50, currently being sent down (see page 120).

Senate Group to Rewrite Air Act

Commerce committee is taking action on McCarran bill, but all other recommendations will be considered.

Senate Commerce Committee this session will tackle the involved task of rewriting the 1938 Civil Aeronautics Act, which was three years in process of enactment.

Sen. Pat McCarran's 177 page bill to accomplish the job will be the basis for hearings, but all other recommendations will be considered. McCarran, co-author of the 1938 act, is not contented to all provisions of his bill and his would suggest.

Rep. Carl Henshaw's bill, proposing creation of a five-member civil aeronautics commission in lieu of CAB and putting CAA under an undersecretary of commerce for air routes, may be introduced on the Senate side and overlaid along with the McCarran bill.

Major proposals—Highlights of the McCarran version:

- Civil aeronautics authority would be formed to take over functions, other than safety, of Civil Aeronautics Board and Civil Aeronautics Administration.

It would be composed of seven members, no more than four from the Senate and three from the House. They would receive salaries of \$17,500 a year. A \$17,000 a year executive officer would handle administrative duties for the authority.

- An safety board of five members, receiving \$9,000 a year, would investigate accidents, make recommendations to the authority, National Aeronautics Council for the Aeronautics, and Weather Bureau and undertake air safety studies.

At least one member would be an active pilot with not less than 5,000 hours in scheduled operations, and at least one member a licensed private pilot.

- Needed certificate. All companies to the equivalent for a certificate of convenience and necessity would have to wait 180 days after enactment, except for operators of aircraft weighing 12,500 lb. or less.

The bill would keep standards and scheduled routes into the single category of "air carrier" and require certificate of convenience and necessity for both.

The authority would, however, have leeway in coordinating regular opera-

tions. Instead of authorizing a specific route, for example, it could authorize a general freedom to be served or a specific type of service, such as coach or freight for a route operator.

- Regulation of fare-making practices. All air contract agreements would be required to obtain licenses. The procedure would be the same as that for issuance of certificate of public convenience and necessity.

- Expedient certificate. McCarran looks on the new class of certificate as "a certificate a man's right to live his life" and keeping the door of air transportation open to new entrants. To obtain an expedient certificate, the applicant would have to show only that he is "fit, able, and willing" he would not have to show that "public convenience and necessity" requires the service.

The experimental service could not duplicate an existing route, and not more than 10% of the operator's own route could come from the new line. The certificate would have a duration of three years, during which the operator would be protected from competition. If it were proved successful, no certificate could be made for a permanent certificate.

- Change for private firms. A "bill of rights" for private firms, accepting them from all regulations except for safety, is needed.

- International agreements by treaty. All agreements involving foreign nations on subjects in the U.S. would have to take the form of treaties, subject to Senate confirmation.

Since the end of World War II they have been negotiated by the Executive Branch as executive agreements. Private rights in U.S. would not covered by treaties would require the same procedure before the authority as issuance of U.S. cannot for certificate of public convenience and necessity.

- Control over international rates schedules, and fares would be given the authority. "This power has been recommended by CAB, which has control over the rates, schedules, and fares



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of U.S. documents, but not international operations.

Mail pay rates. Provisions of the 1950 act, under which mail pay rates were increased, the "ceiling" of a career, would be retained.

McGowan stipulates that he does not want "to turn back the clock" and undo the argument of mail pay from which he has been paid to effect, but simply wants the situation reversed.

Caucasian Change—The Republican side of Senate Commerce Committee is substantially changed this year. Sen. John Stennis is newly established as chairman as a result of the resignation of Sen. Hiram Boren.

Stennis became chairman last year after the death of Sen. Charles McNair, but McNair, an ex-stellar Republican, could claim the post.

Sen. John Sherman Cooper, who had been designated chairman of a subcommittee on aviation by Stennis, also has entered for a place on the Labor and Public Welfare Committee.

Senators filling the Republican vacancies on Commerce Committee James East, William Fawcett, and Fred Smith. Power.

Antitrust Suit Names PAA, Panagra, Grace

An antitrust suit charging Pan American World Airways, W. R. Grace and Co. and Pan American Grace Airways (PAGA) with restricting competition and manipulating transportation between U. S. and Latin America has been filed by Department of Justice.

The complaint alleges Pan American and Grace restricts Pan American to include establishment of an independent competitive airline which would compete with Grace's parallel steamship route along South America's west coast and with an airline operated by Pan American. It was filed in Federal District Court, New York City.

Both Pan American and PAGA are charged with engaging in practices to impede the development of other U. S. airlines authorized by Civil Aeronautics Board to engage in U. S. Latin America air transportation.

Knowlton View—The suit seeks to dislodge both Pan American and the Grace Co. of their stock ownership in PAGA and to ensure each of the defendants from engaging in "conduct restraining or monopolizing air transportation."

Attorney General Herbert Brownell said the complaint seeks to free PAGA so it can develop independently and offer competitive service.

Stanley N. Berger, assistant attorney general in charge of the Antitrust Division, said C-A-B has expressed concern over the potential monopoly upon PAGA's competitive development.

Airport Growth

• New York's four fields set all-time traffic highs.

• Facility expansion in '54 will cost \$27.3 million.

Matropolitan New York's La Guardia, Idlewild International, Newark (N. J.) and Teterboro (N. J.) Airports handled a record 5,150,000 airline passengers in 1953, increasing 18% over 1952 and setting a daily average of 14,000 persons.

Part of New York Authority, operator of the airports, says \$27,344,000 will be spent this year on development of new facilities to handle increasing traffic.

The 1954 budget provides for \$21,644,000 for Idlewild International, \$1,971,500 for Newark, \$175,000 at La Guardia and \$971,500 at Teterboro.

Federal Funds—The four fields at present represent an investment by PAGA estimated at 58% of the total. The federal government and the cities of New York and Newark have made an additional \$121 million available for development of the three major airports.

PAGA has the public investment of more than \$216 million reliably will be expended by an additional \$190 million to provide facilities required "to maintain the port district as the center of world air transportation."

New High—The Port Authority reports these other new traffic highs were established at the four airports during 1953:

• Cargo moved by airlines increased 57% to 321,850 tons. Domestic air freight totaled 197,155 tons, a 70% gain. Domestic cargo amounted to 14,322 tons.

• Aircraft moved through the airports totaled 52,121 tons, 16% higher than the previous year. Start of full-scale mail flights boosted domestic tonnage to 24,693, a 105% gain. International tonnage amounted for 6,495 tons, a 9% increase.

• Aircraft traffic peaked 10% during the year, hugging total annual and departure at the four airports to 191,973. An estimated 116,000 of these were above flights, an increase of 13%.

Non-carrier flights totaled 234,112, 5% higher than 1952. The Port Authority says this year was produced at most activity by a 25% increase in business aircraft activity, "a consequence in the rapid rise in the type of traffic which has been maintained for the past four years."

Busing, Terminal—La Guardia handled the bulk of traffic in the New York area, accounting for 77% of the

Newark Airport Traffic

(Preliminary Report)

	1953	1952*	% Change 1953/1952
Passengers			
Domestic	3,136,945	2,715,087	+15.4
Overseas	12,565	54,676	-44.7
Total	3,149,510	2,769,763	+14.7
Cargo (Tons)			
Domestic	18,987	9,581	+96.9
Overseas	1	1	-
Total	18,988	12,582	+50.9
Mail (Tons)			
Domestic	2,151	5,650	-61.1
Overseas	2	1	+100.0
Total	2,153	5,651	-61.0
Flt. Movements			
Domestic Air Carrier	62,762	61,521	+1.9
Overseas Air Carrier	216	1,995	-89.1
Non Air Carrier	19,910	16,993	+16.4
Total	82,888	80,517	+2.9

* March was closed Feb. 28, 1952 to Nov. 9, 1952, thus no comparable figures for that year.

SOURCE: PORT OF NEW YORK AUTHORITY

La Guardia Airport Traffic

(Preliminary Report)

	1953	1952	% Change 1953/1952
Passengers			
Domestic	6,649,400	5,714,444	+16.1
Overseas	12,773	36,130	-64.9
Total	6,662,173	5,750,574	+15.8
Cargo (Tons)			
Domestic	55,418	30,997	+78.8
Overseas	1	1	-
Total	55,419	30,998	+78.8
Mail (Tons)			
Domestic	20,212	17,489	+15.5
Overseas	37	21	+76.0
Total	20,249	17,510	+15.3
Flt. Movements			
Domestic Air Carrier	168,224	157,621	+6.7
Overseas Air Carrier	3,323	3,000	+10.6
Non Air Carrier	25,240	29,940	-15.7
Total	196,787	190,561	+3.2

Idlewild International Traffic

(Preliminary Report)

	1953	1952	% Change 1953/1952
Passengers			
Domestic	1,376,155	1,256,707	+9.5
Overseas	991,588	798,797	+23.8
Total	2,367,743	2,055,504	+15.2
Cargo (Tons)			
Domestic	25,155	15,254	+64.9
Overseas	14,236	12,796	+11.3
Total	45,629	39,379	+16.4
Mail (Tons)			
Domestic	3,496	3,775	-7.4
Overseas	6,417	5,496	+16.8
Total	10,913	9,271	+17.7
Flt. Movements			
Domestic Air Carrier	47,119	66,919	-29.6
Overseas Air Carrier	32,729	35,126	-6.8
Non Air Carrier	6,973	6,309	+10.5
Total	86,821	108,354	-19.4

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